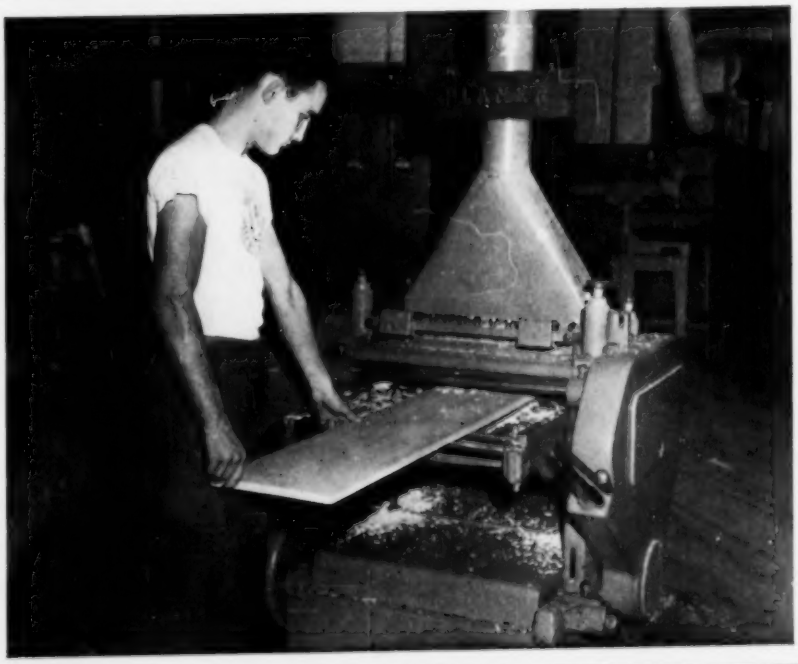
October, 1958 Vol. 47 No. 8

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

The Shop Teachers' Professional Magazine



SHOP PROJECTS NUMBER

Wherever men move mountains

Long before a spade is turned on any construction job, much of the project has been completed. Weeks, months and even years of surveying, planning and design must be accomplished before actual construction can begin. Wherever men move mountains, mountains of rock, mountains of details or mountains of production problems, engineering genius has paved the way.

But where do men of such talents come from? History has demonstrated talents are not hereditary. As youths, these distinguished engineers were no different than the lads who crowd our classrooms today. This creative genius, the spark of achievement, slumbers in every student. Whether this spark is fanned into a flame before it is smothered decides the student's future. Time and time again, instructors of mechanical drawing have witnessed the awakening of this inner genius. Here the student discards his boyish fancies for the practical and achievable. During these formative days, impressions are indelible . . . good and bad. For this reason the student's drawing instruments should be selected with exacting care. Drawing instruments are basic tools of every engineer, and inferior instruments will never inspire skilled workmanship. Drawing instruments are a lifetime possession, and the only instruments worthy of consideration are the very best the student can afford. Precision inspires precision . . . perfection inspires perfection.

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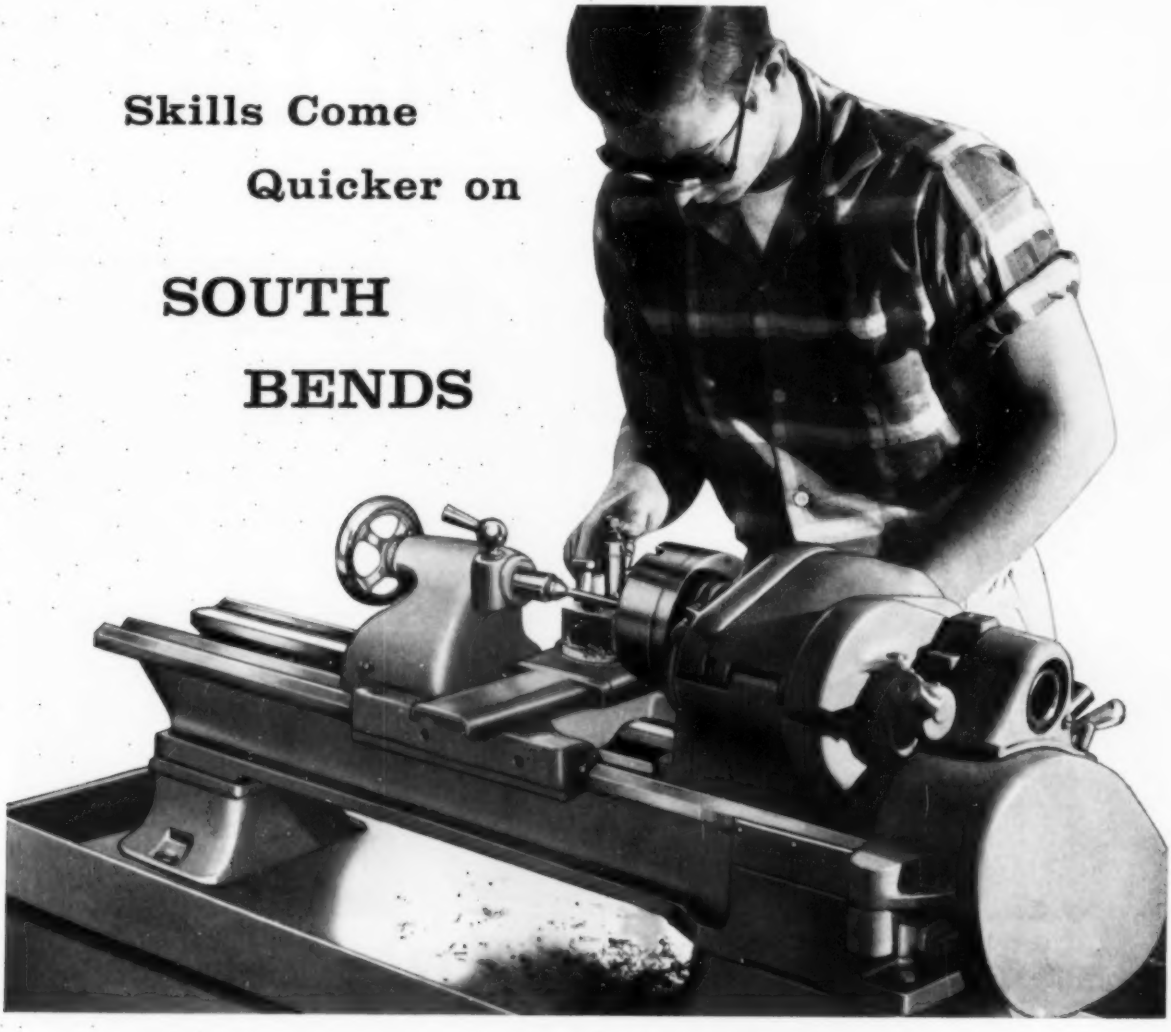

Improved 10" Bench Lathe

Increased Collet Capacity — now $1\frac{1}{16}$" maximum collet capacity and $1\frac{5}{8}$" spindle hole for larger work.

Improved Carriage — lever-operated clutch instantly engages or disengages power feeds with a simple up or down movement. Large, easy reading graduated collars on cross feed and compound rest screws.

New Steel Bench Design — motor and drive fully enclosed in left compartment, storage space in right compartment. Built-in chip pan. Rigid, welded construction.

Prices of 10"-$1\frac{1}{16}$" Lathes start at $1282 f.o.b. factory.

Students learn quick and easy on South Bend 10" Lathes. This lathe is so simple to operate, the student "catches on" quickly and progresses faster. His sense of achievements steps up interest and indelibly implants the knowledge of proper machine handling.

It's the design of South Bend 10" Lathes that makes operation so simple . . . practical and rugged, yet highly efficient. The quiet, powerful headstock has a minimum of parts and will hold accuracy in spite of unusual abuse. The double tumbler quick change gear box gives a selection of 70 threads and feeds. All carriage controls are fast and positive acting—each with a distinctively shaped knob that can be instantly recognized by touch. Every other part of these precision lathes is just as easy to operate—that is why they are so popular with both students and instructors. Write for complete information.

SOUTH BEND LATHE

South Bend 22, Indiana

Builders of Lathes, Milling Machines, Shapers, Drill Presses and Pedestal Grinders

ROCKWELL-BUILT

DELTA 12" WOOD LATHE

Changing spindle speed with a turn of the handwheel is demonstrated for student by Instructor John Gudgel, Thomas Edison School, Springfield.

Safety, Versatility and Ruggedness

make Delta choice of Springfield schools

Designed for wood turning, metal spinning and light metal turning. Perfected Delta variable speed drive offers infinite choice of speeds from 340 to 3200 rpm. Long bed permits up to 38" between centers. Drive mechanism is fully enclosed for extra safety.

Six new Delta 12" variable speed wood lathes were chosen for service in Springfield, Ill. junior and senior high school shops. Here's why: *"They have just about every operating, safety and construction feature we could possibly want,"* says Alfred A. Redding, vocational education director. "Dollar for dollar we feel we've made a good buy—and are building our shop program on a sound basis."

PRACTICAL—Delta, world's most complete line (53 machines, 240 models, over 1300 accessories) provides the *right* tool for teaching *every* wood and metalworking operation. And your students learn on the same tools used so widely in industry. See the new Delta 12" variable speed wood lathes at your Delta Dealer . . . he's listed under "TOOLS" in the Yellow Pages.

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OCTOBER
1958

VOL. 47 NO. 8

Industrial Arts and Vocational Education

The Shop Teachers' Professional Magazine

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★ ★ ★

This Month's Cover

The cover picture of this issue was sent to us by Benjamin J. Novak, vice-principal at Frankford High School, Philadelphia; lecturer in vocational education at Temple University; and lecturer in guidance at Rutgers University.

The student shown is working at the planer in the cabinetmaking shop of the Jules Mastbaum Vocational-Technical School, Philadelphia.

★ ★ ★

BUY U.S. SAVINGS BONDS

★ ★ ★

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CONTENTS

A Look at Automaticity ..... *Marshall L. Schmitt* 231
So You Want to be an Industrial Arts Teacher ... *E. St. Pierre Greaves* 233
Supervised Teaching ..... *Joseph J. Littrell* 234
Vocational Education at the California Institute for Men .. *L. G. Wines* 236
Daily Grades for Shopwork ..... *Brother Leo Geiger, C.S.C.* 239
Military Insignia — What Do They Mean? ..... *Joseph Dries* 240
Hands and Metal ..... *Dr. W. Schweisheimer* 242
Editorials:
Amateur Rocketry 244
Clubs for Shop Students 244
Equipment Values on the Farm 244
The Value of an Altruistic Deed 244

Problems and Projects

Light Bar ..... *Athol R. Baily* 245
Mobile Tool and Storage Panel ..... *William F. Bauers* 246
Contemporary End Table ..... *J. R. Chadwick* 248
Display Rack and Chart Holder ..... *Geo. A. Willoughby* and *Norman Risk* 249
Cannon Wheels Made in the Machine Shop ..... *Wayne E. Collins* 250
Tool Identification Board ..... *Eugene Levy* 252
Radio Repair Instruction on a Low-Cost Budget .. *Louis G. Galambos* 253
New Guinea Mask ..... *Ben Hunt* 257
The Place of Boatbuilding in the Industrial Arts Program of Junior and Senior High Schools ..... *Claude W. Horst* 258
Golf Trophy ..... *Joseph J. Lukowitz* 259
Router Carrier ..... *Ernie A. Hickson* 261
Ferris-Wheel Lazy Susan ..... *Lauton Edwards* 261
Establishing A Personnel Organization ..... *Fred A. Olsen* 263
Junior High Draftsmen Become Junior Architects ... *Gerald H. Jones* 266
Salary Scheduling ..... *Joseph Longo* 268
Achievement Test for Ninth-Grade General Metalwork ..... *Donald G. Lux* 20A

Association News 4A
Personal News 6A
News Notes 30A
New Publications 32A
Business and Personal News 41A
Descriptive Material 42A
Shop Equipment News 46A

Association News

COMING CONVENTIONS

Oct. 10–11. Four State Industrial Arts Conference, at Kansas State Teachers College, Pittsburg, Kans. Secretary, Forest I. Penny, Kansas State Teachers College, Pittsburg, Kans.

Oct. 16–18. Maryland Vocational Association, at 5th Reg. Armory, Baltimore, Md. Secretary, Austin E. Gisriel, Kenwood Senior High School, Baltimore 21, Md.

Oct. 23–24. Minnesota Vocational Agriculture Instructors Association, at Leamington Hotel, Minneapolis, Minn. Secretary, Dennis Lehto, Evansville, Minn.

Nov. 1. North Carolina Industrial Arts Association, at Goldsboro, N. C. Secretary, Tom Haigwood, Eastern Carolina College, Greenville, N. C.

Nov. 5–7. Missouri Vocational Association, at Municipal Auditorium, Kansas City, Mo. Secretary, H. H. London, University of Missouri, 202 Industrial Arts Bldg., Columbia, Mo.

Nov. 6–7. Iowa Industrial Education Association, at Hotel Savery, Des Moines, Iowa. Secretary, Leonard Bengtson, Junior High School, Ames, Iowa.

Nov. 7–8. Kentucky Industrial Education Association, at Kentucky Hotel, Louisville, Ky. Secretary, Alfred H. Meyer, 546 South First St., Louisville 2, Ky.

Nov. 13–15. Mississippi Valley Industrial Arts Conference, at LaSalle Hotel, Chicago, Ill. Chairman, Dr. Verne C. Fryklund, Stout State College, Menomonie, Wis.

Nov. 14–15. New England Industrial Arts Teachers Association, at Eastland Hotel, Portland, Me. Secretary, Edward P. Stach, 1734 Central Ave., Bridgeport 10, Conn.

Why Shop Instructors prefer **MILLERS FALLS BRACES**

It's easier to teach good workmanship with the best tools. That's why so many school shops use Millers Falls bit braces, the world's largest selling quality line. There's a model in every price range, and these fine tools are built to take rough shop use. They're precision designed — built for accuracy, smooth operation and long life. For economy as well as performance, *you can't beat Millers Falls bit braces!*

No. 1950

Unbreakable "Tenite" handle and head. Barber chuck. Forged jaws. A medium-priced shop favorite.

No. 1322

Boxed ratchet mechanism. Barber chuck. Self-opening jaws. Steel-mounted hardwood head with ball bearing action.

No. 732A

Self-centering chuck holds round (1/8" to 1/2" diameter) and square shanks. Another popular school shop model.

No. 772A

Boxed ratchet with ring shift. Lion self-centering chuck. Heavy nickel finish — polished and buffed.

MILLERS FALLS TOOLS SINCE 1868

MILLERS FALLS COMPANY
Dept. IA-39, Greenfield, Mass.

THE 46TH NATIONAL SAFETY CONGRESS

The National Safety Council, 425 No. Michigan Ave., Chicago 11, Ill., will conduct the 46th National Safety Congress in Chicago October 20 to 24, 1958.

Sessions pertaining to all fields of industrial safety — from the aeronautical industries to wood products — will be held during the five-day convention at six Chicago hotels: the Conrad Hilton, Pick-Congress, LaSalle, Morrison, Sheraton-Blackstone, and Hamilton. Headquarters will be at the Hilton.

There will be 300 sessions and 900 speakers, and an estimated group of 12,500 safety specialists from the United States, Canada, and foreign countries will be in attendance.

The exposition section of the 1958 Congress will consist of about 200 exhibits on all types of accident prevention equipment.

1958 AVA CONVENTION

Buffalo, N. Y., gave its American Vocational Association guests a warm, or one might truthfully say, a hot welcome when they met in that city for their 1958 convention.

The time was August 11 to 15, 1958.

The opening general session took place at 10:30 a.m., on Tuesday, August 12. R. E. Bass, the president, presided.

In the afternoon on Tuesday at 4:30 p.m., a buffet dinner and a tour to Niagara Falls was arranged for the visitors. Chartered buses followed a scenic route to the Falls. All those who attended enjoyed the trip thoroughly. For many this was the first time that they had seen the Falls and all were thrilled, when, as the darkness increased, the illumination of the falling masses of water produced a most wonderful picture of unforgettable beauty.

The industrial-arts policy and planning committee, under the chairmanship of William R. Mason, held their meeting on Sunday, August 10, at 3:00 p.m.

At 8:00 p.m., on Sunday, under the chairmanship of John W. Struck, a general meeting of the National Association of Industrial Teacher Educators Executive Committee was held presenting a picture of the NAITE at work. Summaries of the committee's work were given by Donald G. Lux, Ray Karnes, Joe L. Reed, and Walter M. Arnold.

Tuesday morning was set aside for the teachers of industrial arts to visit the commercial exhibits and the exhibits of work done at schools and the 1958 Industrial Arts Awards prize winning articles.

Tuesday at 1:30 p.m., a meeting was held under the chairmanship of Ivan Hostetler, the theme of which was "Implications for Industrial Arts in a Technical Society." This was presented by a panel consisting of Richard O. Knight, Ralph Bowes, Estell H. Curry, Edwin L. Kurth, Robert M. Worthington, and Donald G. Lux.

On Wednesday, August 13, the Industrial Arts Section devoted the morning session from 8:30 to 10:15 to the theme of "Power Mechanics — Its Contribution to the Science

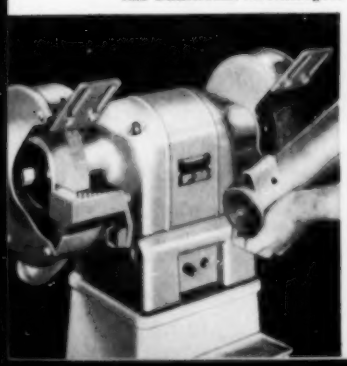
(Continued on page 6A)

Four models...one tailor-made for your training!

PUSH-BUTTON SAFETY SWITCH! 2 pole push-button switch is recessed for your protection, but is easily accessible.

ADJUSTABLE U-SHAPED TOOL REST: Gives full support. Can be adjusted for wheel wear. Perforations stop dirt accumulation.

4 VERSATILE MODELS, 4 POWERFUL MOTORS! 6" through 10" wheel diameters. From ¼ to 1 hp. Each has additional advantages.



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Smooth-running Black & Decker Bench Grinders are POWER-BUILT for long, trouble-free life!

Choose one of the four B&D Bench Grinders for your classes. They're easy and safe to operate! You get top quality tool sharpening, wire brushing, grinding, buffing every time. And your students learn on the same tools they'll be using in industry.

The smooth-running Black & Decker-built motor is designed to give constant speed, regardless of load. Extends life of wheel, causes less overheating. Lubricant-sealed ball bearings protect against abrasive damage. Adjustable tool rests, adjustable spark shields, and built-in exhaust outlets make for safer, easier operation.

Call your distributor for a free demonstration today. For free catalog, write to: THE BLACK & DECKER MFG. CO., Dept. 4510, Towson 4, Md. (In Canada: Brockville, Ontario.)

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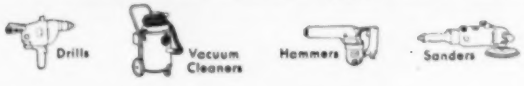

ASSOCIATION NEWS

(Continued from page 4A)

and Mathematics Areas." The panel which consisted of L. L. Gibbons, Sam C. Beeler, and Lloyd P. Nelson, explained that basic science, electricity, chemistry, and mathematics should all be part of what is taught in the industrial-arts shop and that they should all be feeder courses to a tough study of introductory power mechanics. This will help the students get a better insight into the present-day nuclear science.

The time allocation to be adopted in industrial arts may well be one third theory and two thirds practical work.

What should be emphasized with the students should be graphic skills, science and mathematics, electricity, electronics, and nuclear physics applied to the more common problems found in the industrial-arts shop.

At the second general session on Wednesday at 10:30 a.m., the problems of the American Vocational Journal were discussed. It was announced also that the next AVA convention would be held December 6 to 11, 1959, at Chicago, Ill. The 1960 annual meeting will be at Los Angeles in December, and the following year at Kansas City, Mo.

At the business meeting Dr. Geo. Henry was elected a member of the cabinet, and Wesley G. Ketcham as chairman.

Thursday morning the Trade and Industrial section discussed radio communication and electronics in an age of automation.

G. W. Michaels of the Industrial Electronics Division of the General Electric Company of Syracuse, N. Y., spoke on "Educational TV — Closed Circuit for Educational, Community, Industrial-Commercial, and Military Uses."

He said that there are about 400 university TV courses now in use. The New York installation is movable, so it can be taken from school to school.

The Ship's program and dance was held on Thursday at 7:30 p.m. As usual it was well attended and the entertainment was excellent.

The House of Delegates met at 9:00 a.m., on Friday, August 15.

R. E. Bass, AVA President, presided.

The resolutions presented were changed in a few places after which they were adopted.

Samuel F. Fick and E. N. Claude were nominated as candidates for the position of AVA president. A vote by mail will be taken up later to determine who will be president for the 1960 Los Angeles meeting.

F. J. Konekny would be candidate for the representation of the Trade and Industrial Division, and Rosa H. Loving for the same position in the Home Economics Division.

Dr. H. H. London will take over the position of president of the AVA on December 1, 1958. He will conduct the 1959 convention at Chicago.

The attendance this year was somewhat above 3000. The House of Delegates decided that hereafter conventions would again be held in the latter part of the year.

AMERICAN WELDING SOCIETY

The American Welding Society recently announced the dates for its 40th annual convention, which will be held in Chicago.

The technical meetings will be held April 6 to 10, 1959, at the Hotel Sherman, the headquarters hotel, and the Welding Show will be held April 7 to 9 at the International Amphitheatre, Chicago.

The convention provides an opportunity for authors to bring the results of development and research to the attention of the welding, metals, and plastics industries.

Technical papers dealing with the latest developments in welding will be evaluated by experts in each field.

Further information available from *American Welding Society, 33 West 39th St., New York 18, N. Y.*

Both NEW and DIFFERENT SHELDON 15" PRECISION LATHES

NEW

New. Revolutionary double-box Headstock (Pat. Pend.)
New. "WORK-HOLDING ONLY" Spindle.
New. Single-Shift Back Gear Lever on Headstock.
New. Headstock and Apron running in oil.
New. 1⅛" Hole through Spindle.
New. 60-pitch Gear Box with built-in Lead Screw Reverse.
New. Amazing LOW PRICE.

DIFFERENT

Different. Spindle rigidly held in two large "Zero Precision tapered roller bearings arranged in box-type design.
Different. Electrical switches and push-button stations fully enclosed in built-in well in headstock.
Different. Two independent clutches in apron for selecting power feeds.
Different. Cam-action tailstock clamp for rapid release and instant locking of tailstock.
Different. Triple, cogged, V-belt outboard drive—eliminates intermediate shafts—delivers more power to spindle.

$2350.00 base price F.O.B. Factory (Less Electricals)

This is an all new lathe that bridges the gap between conventional belt driven and geared head lathes. It combines the capacity and power of a geared head with the economy and flexibility of a belt driven lathe. Available with 5', 6' and 8' bed lengths providing 31", 42" and 66" center distances.

Especially significant to schools because here is a lathe which provides big lathe capacity, "feel," power, weight and safety . . . all for the price of a small lathe. This is an important advance—the development of a really big lathe for school use priced within range of school budgets.

If you have a training program designed to teach students industrial techniques, this is the lathe you should have. Here is a lathe to know about, to study, compare and try before buying.

Write for Catalog Sheets

10", 11", 13", 15" Sheldon Tool Room Lathes, Variable Speed Lathes, Turret lathes, Milling Machines and Shapers, and Sebastian Geared-Head Lathes.

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Personal News

DR. WM. J. MICHEELS LEAVES FOR INDONESIA

Dr. William J. Micheels, professor and chairman of the department of industrial education, University of Minnesota, will shortly leave for an assignment in Indonesia. Dr. Micheels has been appointed as the senior advisor on a team of technical educators from Dunwoody Institute and will assist the Government of Indonesia in reviewing the progress of technical education and making recommendations for the future development of this field of education in additional centers. Dunwoody Industrial Institute will be administering this project, with financial grants to Indonesia by the Ford Foundation.

As a representative of Dunwoody Institute, Dr. Micheels will serve as consultant and advisor to a study Committee of the Ministry of Education, with offices located in Bandung, Indonesia.

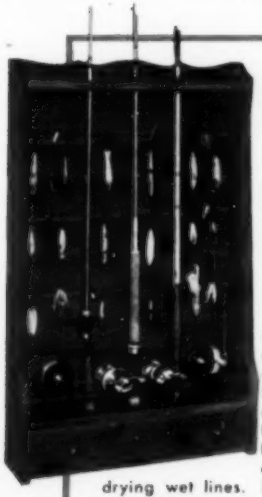
Another aspect of the work of the Dunwoody team under the direction of Dr. Micheels will be to assist five other teacher

(Continued on page 29A)

FROM BOATS TO TIE-RACKS!

New GILES & KENDALL catalogue offers
dozens of challenging "do-it-yourself" kits.

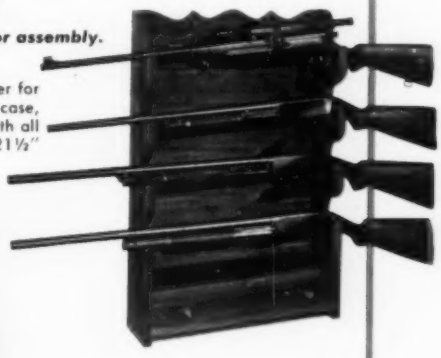
Send for yours today!



Pre-cut! **No waste!**

Every kit complete with hardware and directions for assembly.

#404 Four-Gun Rack with full width drawer for ammunition and cleaning gear. Solid cedar case, matched cedar plywood back. Complete with all screws, brass pulls, safety lock. 32" high, 21½" wide.



#303 Tackle Rack with full width drawer for hooks and accessories. Holds rods, reels, any number of flies, lures, plugs. Handy brass hooks around case for drying wet lines. Solid cedar with matched cedar plywood back. Complete with screws, brass hooks, drawer pulls. 38" high, 21½" wide.

#183 Football Rack, solid cedar. Hangs on wall. 18½" wide, 18" high.

#M-17 Cocktail Table, solid cedar. 20" x 44", stands 15" high. Complete with hardware including brass ferrules on legs.

#182 Baseball Rack, solid cedar. Hangs in corner or anywhere in room. 22" wide, 18" high.

#101 Cedar Chest, from heart of genuine Tennessee aromatic red cedar. Solid ¾", with 5-ply panel top that will not warp or crack. Mothproof. Complete with all hardware. Also walnut, mahogany and oak cedar chests. Wide selection in sizes and styles.

#180 Basketball Rack, solid cedar 18½" wide, 19" high

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Please send me your new free catalogue of over 50 "do-it-yourself" items made of genuine Tennessee aromatic Red Cedar and other woods. (Students – send 25¢ in coin or stamps)

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permanent package you use along with the tool!

- tough paperboard tool-holder in heavy plastic sleeve
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- "picture-window" design bold size labeling for fast, easy selection
- tools reach you factory-sharp, stay sharp and smooth
- tools kept under cover, stay clean, protected from nicks
- ideal for school shop use

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WATCHEMOKET eye SAVERS

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COVER GOGGLES

FOR 100% EYE PROTECTION

For Heavy Impact. Replaceable, optically correct, methacrylate lenses in choice of clear, green or black frame. Clear Lens is .125" thick; Light and medium green lenses .100" thick; dark green lenses .080" thick.

Stac-Vent Ventilation keeps the goggles fog free. Also available with Regular, Screen Ventilation or No Ventilation.

Soft Vinyl Frame form-fits the contours of the face and nose . . . closes the gaps around nose and cheek . . . more protection . . . more comfort.

Large frame fits over any prescription spectacle . . . easy to adjust . . . comfortable to wear.

WATCHEMOKET eye SAVERS

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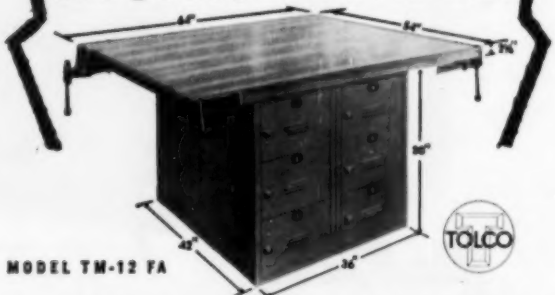
WITH TOLCO'S "STOR-MOR" BASE



MODEL TM-12 FA

Tolco's "Stor-Mor" features exclusive steel splined tops of 100% laminated Northern hard maple. Twelve individual heavy gauge steel lockers—6 each side—ball point fasteners and mating pulls and lugs for padlocks. Available in baked green or gray enamel.

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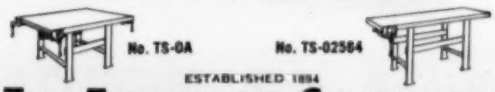

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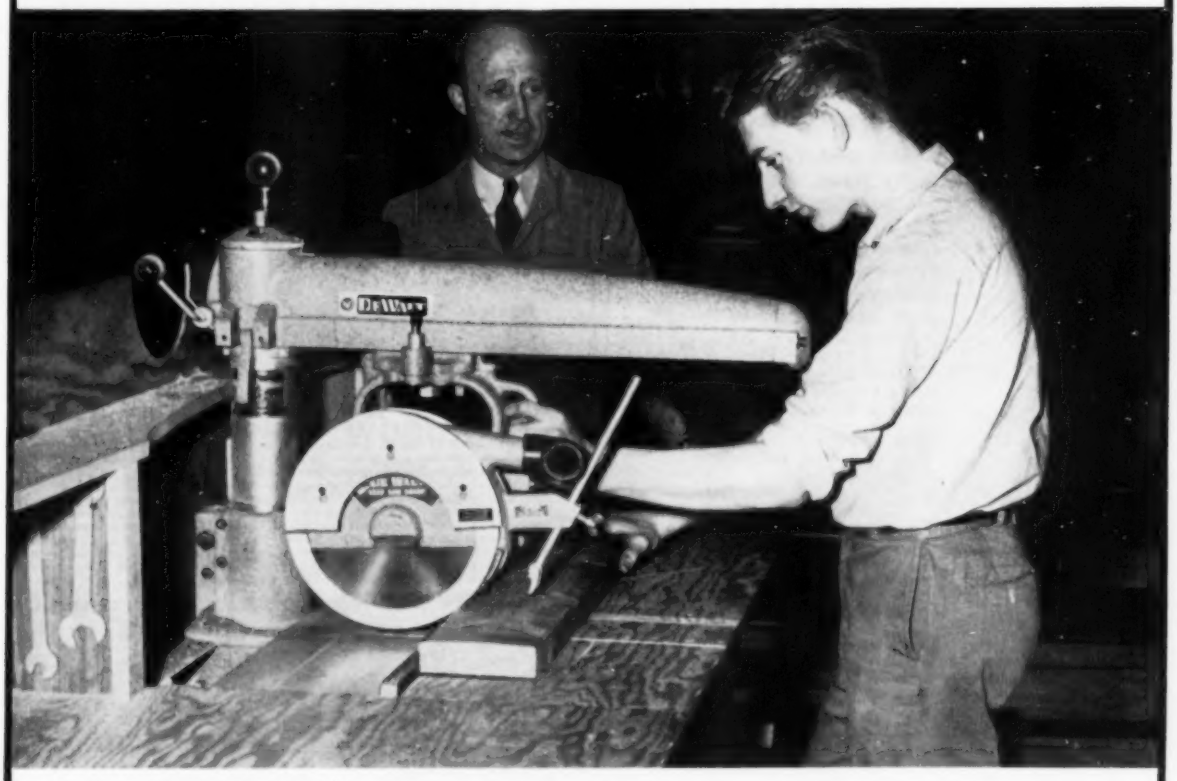
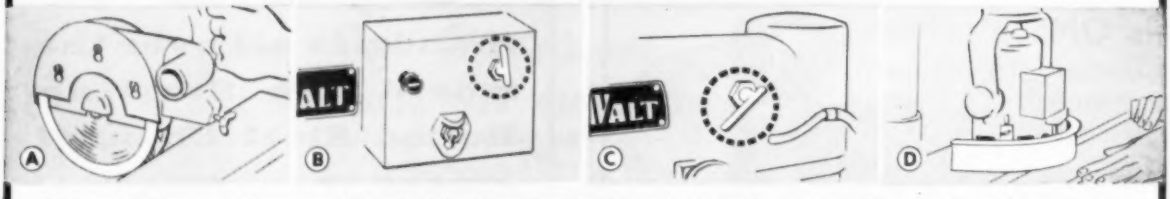


And De Walt® has the safest record in industry!



You need these exclusive operating safety features: **A**—Simpler, safer top-side cutting with exclusive safety guard. See your mark *and* your saw. **B**—Power brake stops saw in 4 seconds for *added* safety. **C**—Safety key switch prevents unauthorized use. **D**—De Walt becomes tilting arbor shaper with exclusive shaper guard—gives 50% more shapes per cutter. Combines 12 basic power tools. Builds into workbench, gives safer straight-line handling.

Train your students on an AMF De Walt—preferred in both home and industry for accuracy, versatility—*plus the safest record of performance.* Arm raises, lowers, swings 360°. Motor and saw ride on arm, rotate 360°, tilt downward past 90°. Powerful direct-drive motor accommodates any circular tool, saves cost of separate machines. De Walt's the saw your students will later use!

2 popular sizes for schools...GW-I, 1½ hp, 10″ size for industrial arts...GA-N, 3 hp, 12″-14″ size for vocational training.

See your supplier or send for FREE BOOKLET.

Another AMF Product
DE WALT POWER TOOLS

De Walt Inc., Dept. IA-810, Lancaster, Pa., Subsidiary of AMERICAN MACHINE & FOUNDRY COMPANY

☐ Please send me FREE BOOKLET on Job-Tested Safety Cutting Methods
☐ Please send information on De Walt 16mm sound classroom film

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☐ *Students!* Check here for special literature

SOUTHERN SCREWS

PHILLIPS OR SLOTTED

A Size and Type for Every Need

Wood Screws — Phillips or Slotted. Flat, round, and oval in steel, brass, silicon bronze, aluminum, stainless steel.

Other Southern Screws and Bolts:

A, B, C, & F Tapping Screws
Machine Screws & Nuts
Dowel Screws • Wood & Type U Drive Screws • Carriage Bolts • Stove Bolts • Hanger Bolts.

Sold through leading Hardware and Building Supply Stores.

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Fine tools that encourage Good Work

ARMSTRONG WRENCHES

An ARMSTRONG Wrench feels right—is balanced. It goes over nuts or screw heads easily, grips firmly without sloppiness, won't round corners—because openings are carefully machined to correct sizes. It's safe, strong beyond need without clumsy bulk—because of superior design and selected steels, heat treated to proper degree of hardness and tensile strength. It's quality finished, ARMALOY (alloy steel) Wrenches in chrome plate with heads buffed; HI-TEN (carbon steel) Wrenches in baked-on gray enamel with heads ground bright . . . all plainly marked for size. All are uniformly excellent tools manufactured under strict quality control, by modern methods, with modern equipment in a modern tool plant . . . 1537 different industrial sizes and types —single wrenches, or sets in metal cases, boxes or rolls . . . each a quality tool. Armstrong Wrenches are "Fine tools that encourage good work."

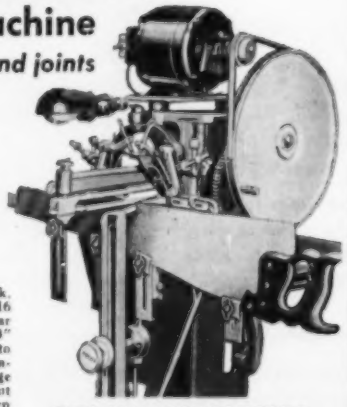
ARMSTRONG BROS. TOOL CO. 5222 W. ARMSTRONG AVE. • CHICAGO 46, U.S.A.

SAW FILING

This ONE Machine

automatically files and joints

HAND, BAND, CIRCULAR SAWS



The Foley Saw Filer is ideal for sharpening saws used by students in school shops. It keeps them in tip-top shape, faster and better than by hand filing. Used by Army, Navy, hundreds of manual training departments and industrial plants. The Foley is the only machine that files and joints all hand, back, and mitre box saws from 3 to 16 points per inch, crosscut circular saws up to 16" diameter (24" optional), and band saws up to 24' long. Patented jointing principle automatically evens up large and small teeth, so saws cut faster, truer, cleaner — stay sharp longer. Foley filed saws have less breakage and last longer.

30-DAY TRIAL OFFER

You may have the privilege of using the Foley Saw Filer in your own shop for 30 days. Write or send coupon for details and list of school users.

TYPICAL SCHOOL USERS

Berea College, Berea, Ky.; Board of Education, Cleveland, Ohio; Boys Technical H. S., Milwaukee, Wis.; Charleroi School District, Charleroi, Pa.; Redlands Public Schools, Redlands, Calif.; Stout Institute, Menomonie, Wis.

FOLEY Automatic SAW FILER

FOLEY MFG. CO., 3318 N.E. 5th St., Minneapolis 18, Minn.
Please send information and Trial Offer on Foley Saw Filers.

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School.....

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Sterling Heavy Duty Flask with steel trunnions, clamps and clamping bars.

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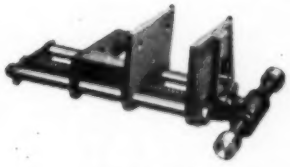
Whatever Your School Shop Need Morgan Has a Vise to Meet Your Requirements

For Woodworking

SOLID NUT CONTINUOUS SCREW VISE



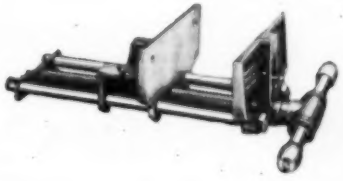
Designed and built to withstand the most severe service. The extra heavy Cold Rolled Screw and SOLID NUT will last a lifetime. Note the simplicity of construction; every part carefully machined and interchangeable cold rolled side bars threaded and held in place by hexagon nuts — not riveted. Fits flush on standard 2¼" bench top. Aluminum handle furnished as standard equipment. Hardwood handle furnished upon request.

JUNIOR WOODWORKERS VISE

Solid Nut continuous Screw woodworking vise with stop in front jaw. Made of semi-steel castings. Fully machined. Hardwood handle. Fits flush on standard 2¼ inch top.

Same fine quality of materials and workmanship that go into the manufacture of all Morgan Vises.

QUICK ACTION VISE



The working action of this vise is the most simple and effective of any of the screw adjusting type. The screw, having intercepted threads, operates in a half nut, a slight turn of the handle disengaging the screw and permitting jaw to slide back and forth at will. A turn in opposite direction engages screw with nut, holding the work firmly in place. The half nut is a high quality bronze casting, and all parts of the vise are carefully machined and finished.

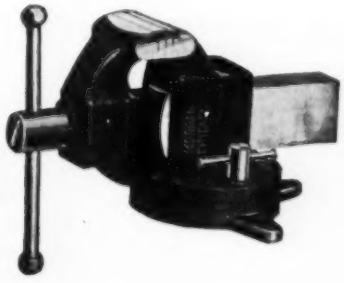
These vises are furnished either with or without a stop in the front jaw. Every vise fits flush on a standard 2¼" top.

There is absolutely nothing about this vise to get out of order. Aluminum handle furnished as standard equipment. Hardwood handle furnished upon request.

For Metalworking

MACHINISTS' BENCH VISE

Solid Jaw and Stationary Base and Solid Jaw and Swivel Base

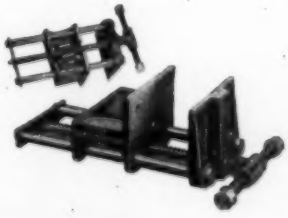


For metal handling. Special semi-steel casting. Sliding bar's accurate milling means a snug fit of the broached base opening. The solid steel forged screw engages in a malleable iron acme threaded nut. A lifetime, rigid-gripping vise.

Swivel base may be rotated 360° and clamped in any desired position. A specially designed nut locks the base. No play despite heavy duty. Unusual rigidity and strength for a swivel base vise.

NEW — DUAL PURPOSE VISE

A Continuous Screw Vise With Rapid Action Movement



Embodies an extra heavy cold rolled, buttress thread screw. Same high quality semi-steel castings coupled with skilled and accurate machining. Vise engages and disengages at any point, by a simple turn of the handle. Includes the best features of the continuous screw vise and gives you the advantages of a quick action vise. Adjustable stop built into front jaw. Aluminum handle furnished as standard equipment. Hardwood handle furnished upon request.

Write today for our free catalog.

Morgan Vises are unconditionally guaranteed. Finest quality in materials and workmanship assure you of long lasting, dependable vises which means long-run replacement savings.

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APRONS are a necessity in your shop!

APRONS PROVIDE ECONOMICAL CLOTHING PROTECTION AND A NEAT UNIFORM APPEARANCE IN YOUR CLASS

Aprons are not expensive. One apron costs less than a cleaning bill resulting from one shop mishap. Full cut, properly fitted to protect clothing. Strong tapes. Two roomy pockets for pencils, notebooks, etc.

ORDER NOW FOR PROMPT DELIVERY.

FREE APRONS! *WITH EACH DOZEN APRONS YOU BUY, WE GIVE YOU ONE FREE APRON. USE THESE FREE APRONS FOR EMERGENCY - OR FIGURE YOUR COST ON THE BASIS OF 13 APRONS FOR THE COST OF ONLY 12.*

ECONOMY DRILL APRONS

Provided with PERSONNEL PLAN CARDS which fit into a cardholder pocket. Cards are printed, Supt., Foreman, Safety Engineer, Secretary, Toolroom and Maintenance. Instructors and students benefit through this educational PERSONNEL PLAN. Develops leadership and respect for authority. Helps the instructor manage a large class by permitting students to handle routine details.

ECONOMY aprons come in TAN, BLUE, GREEN, OR ORANGE. Colors can be used to designate different jobs within a class, or TAN can designate woodworking, BLUE metal working, GREEN automotive, etc.

PREPAID — One free apron with each doz.

SIZE	UP TO 12	12 TO 24	25 TO 49	50 TO 99	100 UP
24 x 28	$1.05	$1.00	$ .95	$ .90	$ .85
28 x 36	1.10	1.05	1.00	.95	.90
28 x 40	1.15	1.10	1.05	1.00	.95
28 x 45	1.25	1.20	1.15	1.10	1.05

HEAVY DUTY APRONS FOR ROUGH WORK

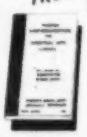
Without PERSONNEL PLAN CARDS. BLUE denim and BLUE/WHITE hickory stripe denim. 24x28 in BLUE denim only

PREPAID — One free apron with each doz.

SIZE	UP TO 12	12 TO 24	25 TO 49	50 TO 99	100 UP
24 x 28	$1.10	$1.05	$1.00	$ .95	$ .90
28 x 36	1.30	1.25	1.20	1.15	1.10
28 x 42	1.40	1.35	1.30	1.25	1.20
28 x 45	1.45	1.40	1.35	1.30	1.25

Prices slightly higher west of Rockies. Sizes shown are "cut sizes" before hemming

FREE



SHOP ORGANIZATION TEXT BOOK

Included with your apron order. Solves many problems of class management. Tells you how to organize your class just like management system used in industry. Ten chapters - over 60 pages with many illustrations and charts. Well written by shop authorities.

EXCLUSIVE INSTRUCTORS SHOP COATS

Designed exclusively for the Industrial Arts teacher. Not sold in stores. Sanforized and colorfast. Blue, Green, Tan, Gray, Orange or White. Sizes 36 to 46

SC SHOPMAN - Swinging tool pocket. Pencil pocket. Two lower pockets with flaps to keep dirt out. Matching metal snaps. Pleated action back with belt. Side vents. Double cuffs.

$7.50 or 2 for $14.48. PREPAID!

LC CLASSMAN - Pencil pocket. Two lower pockets. Box style back with belt. Matching metal snaps. Side vents.

$6.50 or 2 for $12.50. PREPAID!

(Prices slightly higher west of the Rockies)

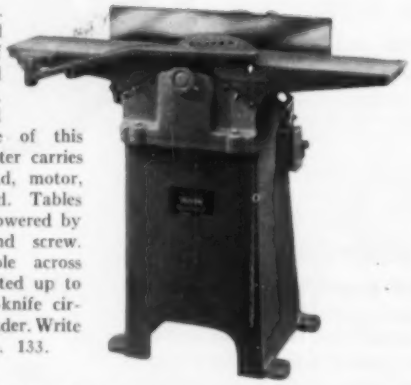
"The School Apron Folks"

CAN-PRO Corporation

29 E. McWilliams St. Fond du Lac, Wisconsin

OLIVER 6-inch Jointer is machined to give smoothest work and many extra years of service

The Oliver 6-in. Jointer is ideal for all classes of small work found in school shops. The sturdy, rigid one-piece frame of this heavy-type Jointer carries tables, cutterhead, motor, fence and guard. Tables are raised and lowered by hand knobs and screw. Fence, adjustable across table, can be tilted up to 45°. Has three-knife circular safety cylinder. Write for Bulletin No. 133.



OLIVER MACHINES FOR SCHOOL SHOPS . . .

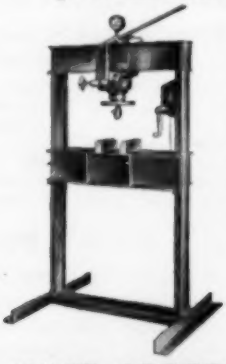
Band Saws	Jointers	Disk & Belt Sanders	Metal Spinning Lathes
Circular Saws	Mortisers	Speed Lathes	Wood Trimmers
Borers	Planers	Tenoner	Tool Grinders
Jig Saw	Shapers		

Oliver makes an 8-inch heavy-type Jointer, and others up to 30 inches.

OLIVER MACHINERY COMPANY
Grand Rapids 2, Michigan

DAKE PRESSES for School Shops

Shop training is most helpful when your pupils use the same practical presses they are apt to find when they work after graduation.



DAKE HYDRAULIC PRESS Model 25 H

Includes pressure gauge, hand wheel for rapid advance, automatic ram return, and table lifting device. 25 tons capacity.

DAKE ARBOR PRESSES

Have large opening and slotted table plates. Available in single and compound leverages, with capacities from 1 to 25 tons.

Catalog No. 350 describes Dake Presses suitable for school shops. Write for a free copy.

DAKE CORPORATION
653 Robbins Road
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Starrett® TOOLS

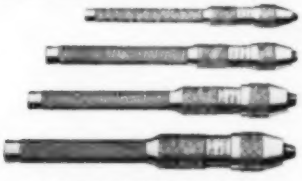
HELP TURN STUDENTS INTO CRAFTSMEN

When you reserve a small part of your budget for Starrett Tools, you are investing in the future welfare of your boys. The knowledge of and respect for precision methods they acquire by working with genuine Starrett Tools will help them all the rest of their lives.

Your Industrial Supply Distributor has these and many other Starrett Tools.

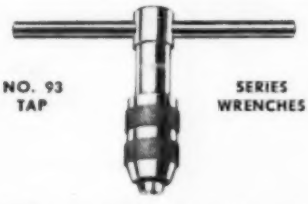
STARRETT SETS OF TOOLS

No. 9028 shown has 12" combination square, 1" micrometer, center gage, center punch, 6" rule, 4" inside and outside calipers, dividers and hermaphrodite calipers. Many other sets to choose from.



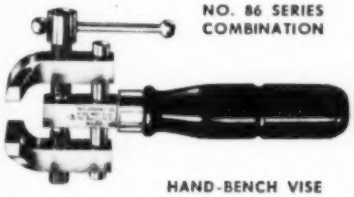
NO. 162 SERIES PIN VISES

Used for holding small stock, wire, taps, files, reamers, scriber points, etc. Sure-grip knurled handles; quick-acting hardened jaws. Set of four has 0 to .187" range.



NO. 93 TAP SERIES WRENCHES

Sturdy, positive-holding wrenches with sliding T-handles for hand use — also nicely balanced and centered for use in lathe center or drill press. Set of four holds taps from 1/16" to 1/2".



NO. 86 SERIES COMBINATION HAND-BENCH VISE

Available with both handle and clamp for use as a combination hand vise and small bench vise. Jaw capacity, 1½". Length with handle, 7".

NO. 564 "UNIVERSAL JUNIOR" INDICATOR

A highly versatile indicator recommended for school shop use. Adaptable for use with machine tools, surface and height gages. Graduated .001" — range .010".

NO. 236H SERIES COMBINATION DEPTH AND ANGLE GAGE

Combines a caliper, depth gage, angle gage and hook rule. Also furnished with rod for use in small holes and slots. Tempered steel rule is graduated in 32nds and 64ths.

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Emphasize proper tool care with this special lubricant made to our specifications. Lubricates tools, instruments, light machinery; protects finished surfaces from rust. 3¼ fl. oz. cans.

FREE EDUCATIONAL AIDS

New Bulletin 1203, "How to Read, Use, Care for Micrometers and Vernier Gages." Also, "Training Aids Bulletin No. 1202" which shows many Starrett training aids available free or at small cost.

BIG NEW STARRETT CATALOG

Describes the complete line including many tools priced to fit school shop budgets. Write for your free copies. Address Dept. (CE), The L. S. Starrett Company, Athol, Massachusetts, U.S.A.

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PRECISION TOOLS

World's Greatest Toolmakers

PRECISION TOOLS • DIAL INDICATORS • STEEL TAPES • GROUND FLAT STOCK • HACKSAWS • HOLESAWS • BAND SAWS • BAND KNIVES

Train Students in *Armature Reconditioning* with these low-cost Snap-on® tools

Armature reconditioning is a basic servicing job for any skilled mechanic. You can train your students in this important function with these low-cost *Snap-on* armature reconditioning tools.

AT-2 ARMATURE RECONDITIONING TOOL SET

An inexpensive tool that turns down armatures with same precision as expensive lathes — and does it faster, without removing back plates. Cutting depth is controlled to finest shaving.

Tool requires no motor, no special centerless chuck. Interchangeable collets adapt tool to various size armature shafts.

UC-6 MICA UNDERCUTTER

Built to do a superior undercutting job, the UC-6 handles many commutator sizes without frequent adjustment. Self-cleaning, interchangeable blades eliminate chip packing.

MT-325 ARMATURE GROWLER

For reconditioning generators, starting motors. This heavy-duty growler locates type of defect — finds defective wiring, poor connections, severed coils, transposed leads, grounds, open circuits. Special isolation coil winding eliminates shock hazard. Unit complete with 0-30 ampere meter, extra-heavy power cord, two safety-tip insulated probes, adjustable bar-to-bar probe, test light.

SNAP-ON TOOLS CORPORATION

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"Jorgensen" TRADE MARK REG U S PAT OFF and "Pony" REG U. S. PAT. OFF.

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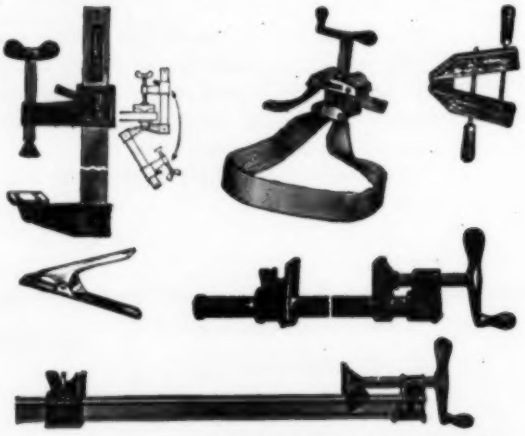
Manufactured by specialists who have set the standard in clamp design for nearly 60 years. Catalog, showing these and many other styles, furnished free upon request.



the clamp folks

ADJUSTABLE CLAMP CO.

424 N. Ashland Ave., Chicago 22, Ill.

CONNECTICUT

Model U322

Only $165.00

UNIVERSAL BENCH BRAKE for school shops

A quality tool accurate and easy to operate. Versatility makes it ideal for training. Popular in commercial sheet metal shops for light production, box and pan work. Replaceable bronze bushings provide long machine life. Available in 3 and 4 ft. models, universal or plain. Write for Bulletin U 322I.

Rated Capacity: 3/16 flange on 22 gage mild steel, full brake length. Fingers of case hardened steel in widths of 2, 3 and 4 inches permit 3 inch box and pan depth. Other Prices of the Bench Series

4 ft. Universal,	$220.00
3 ft. Plain,	114.50
4 ft. Plain,	134.50

All prices F.O.B. Old Saybrook, Conn.

W. WHITNEY STUECK, INC.
Old Saybrook, Conn.

You get MORE for LESS with DURO POWER TOOLS

COMPARE and see...

Specifications	Duro	Brand "A"	Brand "B"
Table Size with Ext.	33"x38"	27½"x35"	32½"x50½"
Arbor Diameter	⅝"	¾"	⅝"
Depth Cut 90°	3¼"	3⅛"	3⅛"
Depth Cut 45°	2-7/16"	2⅛"	2⅛
Maximum Distance Blade Fence	25½"	25"	25"
Distance Ahead Blade	14¾"	12½"	13"
Number Belts	3	2	3
Mitre Gauge Control *	Yes	Yes	No
Price	$325.00	$335.00	$334.50

*PATENTED

The chart above gives a quick, capsule picture of Duro's circular saw superiority when compared with 2 nationally advertised models. This superiority is equally evident when the entire Duro line of power tools is compared with any of the leading makes. Tool for tool, feature for feature, price for price—Duro has been repeatedly acclaimed the No. 1 power tool buy in America! Duro Tools offer an exclusive "built in" rigidity, a lifetime ruggedness, "years ahead" design, unique safety features and precision accuracy that's unduplicated!

If you're searching for finest quality—Duro is your best bet. If performance is your prime requirement, choose Duro. If price is a major factor—Duro will give you more, much more, for less!

The complete Duro line includes circular saws, drill presses, band saws, scroll saws, sanders, lathes, jointers, routers, plus a full line of accessories. Write for the comparative facts today.

Send for FREE power tool catalog, Comparison Chart, and Shop Plan Guide!

All 3 are free. You will get a graphic picture of Duro superiority where it counts most – in size, capacity, features and PRICE! Write today.

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Gentlemen: Please send me "3 for FREE" your Power Tool Catalog, Comparison Chart and Shop Plan Guide.

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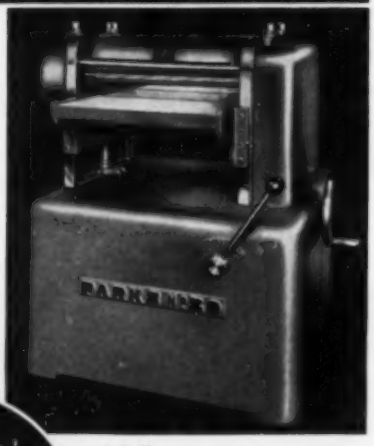
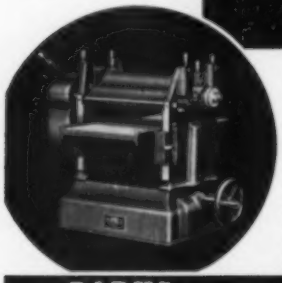
PARKS PLANERS Give Your Students Practical Experience on Popular Industrial Machines

. . . the experience of working on the same type of high-speed planers they will eventually use in their trade.



20" THICKNESS PLANER

PARKS NO 20—A modernly designed, precision-built, high speed production surfacer that planes lumber up to 20" wide and 6" thick. Available with knife-grinder at additional cost.



12" THICKNESS PLANER

PARKS NO. 95 — A compact, sturdy thickness planer that offers mill planer precision and ruggedness at a sensationally low price. Write for descriptive literature on both machines illustrated as well as on PARKS wood- and metal-cutting Band Saws, Radial Saws, Planer-Jointer Combination Machines.

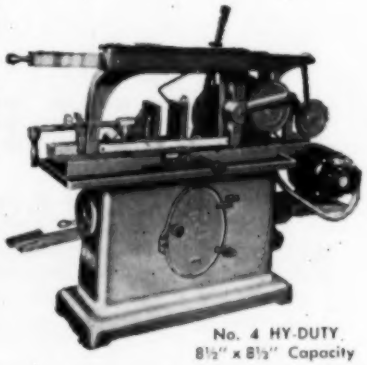
The PARKS WOODWORKING MACHINE COMPANY
Manufacturers of Quality Woodworking Machines Since 1887
DEPT. 22, 1546 KNOWLTON STREET, CINCINNATI 25, OHIO

for rugged . . . *fast cutting* Power hacksaws, choose KELLER

Jefferson #601
4" x 4" Bench Model

A low cost, efficient saw with fast acting swivel vise and pressure relief on back stroke. With or without motor. Standard motor 115 V., 60 cycle, A.C. Installed, wired, ready to operate. Other motors available.

Choose from 10 Models in 5 Capacities from 4" x4" to 10½"x9". Bench and floor models, wet or dry cut are all built for fast cutting with long saw life and minimum maintenance.



No. 4 HY-DUTY
8½" x 8½" Capacity

Specialized builders of power hacksaws since 1931.

Write for complete details and specifications.

SALES SERVICE MACHINE TOOL CO.
2365 UNIVERSITY AVE., ST. PAUL, 14D, MINNESOTA

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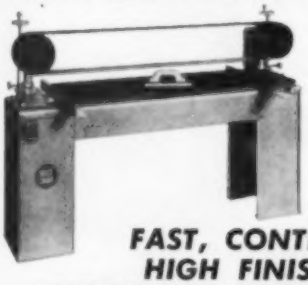

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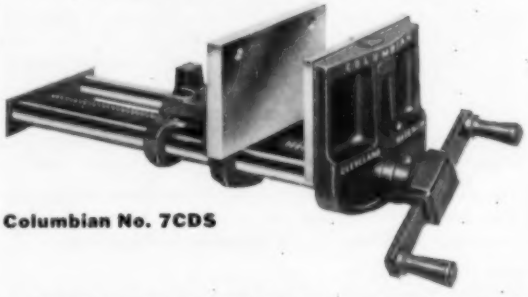

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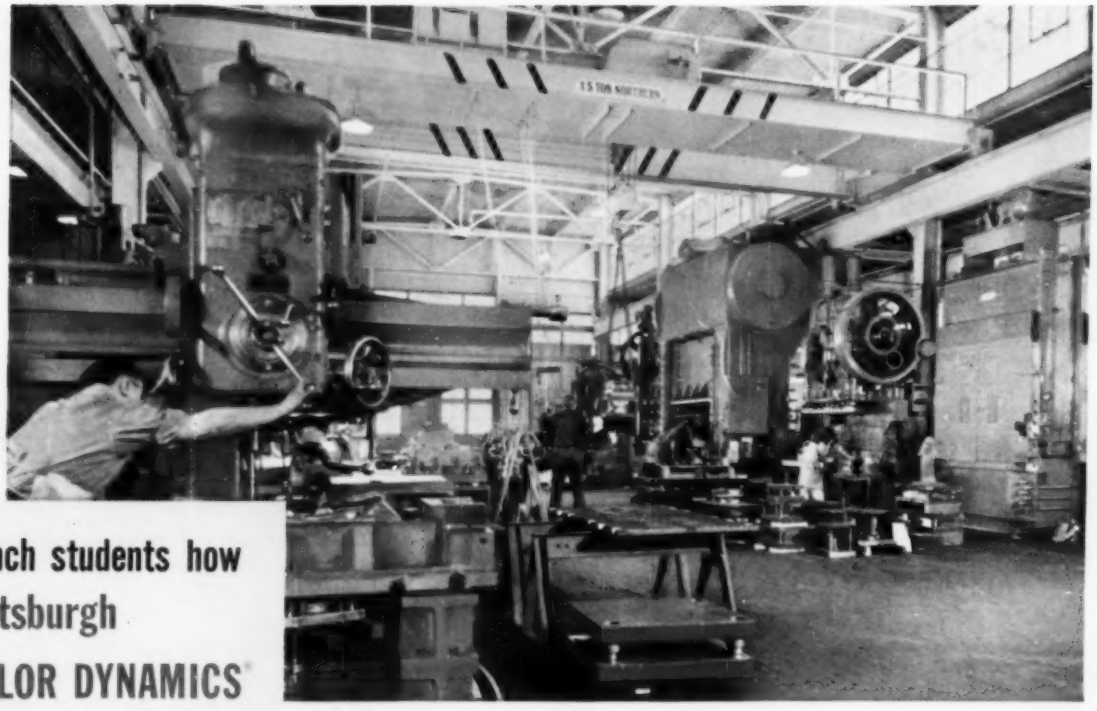

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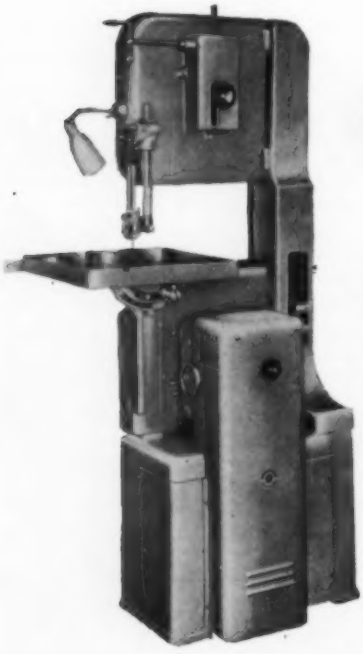

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Industrial Arts and Vocational Education
The Shop Teachers' Professional Magazine
OCTOBER 1958

A Look at Automaticity

MARSHALL L. SCHMITT
Specialist for Industrial Arts
Dept. of Health, Education, and Welfare
U. S. Office of Education
Washington, D. C.
(Formerly Associate Professor, Industrial Arts Education, North Carolina State College, Raleigh, N. C.)

In this article, I wish to direct the thinking of the reader to the word *automation*, which involves both automatic operations and the process of making things automatically, to three aspects: (1) the nature of man; (2) the automatic factory — is it fact or fiction; — and (3) implications for education, specifically industrial arts.

The New Technology

To understand this new technology of automation, a good look at the creature man gives us some insight. A psychologist has said that the internal bodily processes are co-ordinated in such a way that the organism maintains or attempts to maintain constant internal balance. If the intricate balance between these processes or with any one of the processes is disturbed, the body attempts to readjust itself in order to bring the process back into harmonious balance. This process of maintaining a constant internal balance is called *homeostasis*. It is a fact that bodily temperatures cannot vary from 98.60 deg. F. more than a few degrees without endangering the life of the organism. This equilibrium, then, is maintained within limits by automatic adjustments within the body.

Other illustrations in the use of the body can be made; for instance, the blood pressure of a normal human being increases in case of fright or extreme emergency and returns to its normal pressure whenever the emergency is over — the individual not usually being aware of the change taking place within him.

An analysis of this process reveals some interesting aspects. Just recently our washing machine motor burned and smoked violently at our home. My wife, in order to pull the electric cord to remove the danger, moved a seven cubic foot refrigerator three feet across the room. When it was over, she was unable to move the refrigerator back to its original position due to its excessive weight. What occurred might go something like this. The eyes or other senses of the human being realized the immediate danger, this signal was then sent to the brain, the brain set into action through its intricate control systems with the body, motor control with enough strength to move the refrigerator.

The preceding illustration is a little out of the ordinary; however, here is an experiment you can try.

Write a paragraph on a sheet of paper, then close your eyes and write the same paragraph again. No doubt it will be ragged. You need your eyes to perceive the amount of error and *feed back* to the brain the correct signal so you can cross the *t's* or dot the *i's* properly. The eyes or other senses form what is called a *closed loop control system*. A small amount of energy is fed back to the brain so adjustments can be continually made to get the desired output.

We make many complicated corrections without conscious thought. Driving an automobile is another example. An experienced driver has a predetermined notion of how much energy to use to turn the wheel. If he uses too much, he makes the necessary correction.

It is interesting here to note a similarity between the driving of an automobile and the *closed loop* control of certain machines. The phenomenon known as *hunting in closed loop systems* occurs when too great a degree of correcting energy is put into the controlled device. As a result, the mechanism overshoots the desired point. We have all followed, no doubt, an inexperienced driver down the road and know the overdriving that is done. I suppose I might state that the reason my knees are shaking is due to the fact that my blood pressure is too high at this point, and this *hunting* that I spoke about is taking place in the vicinity of my knees.

Engineers refer to another control system called an *open loop*, the simplest of which is an electric light controlled by a wall switch. Another illustration would be a starter button on an automobile dash. These, of course, are all controlled by an individual; however, they may employ one principle

of the *closed loop system*, and that is, the control operates at low energy levels as in the case of the starting switch on the automobile. The energy expended in turning a switch or closing a valve need have no particular relation to the energy that is being controlled.

A thermostat in a living room and the light switch are controlling devices, however, the thermostat is representative of a very different type of control system for it is a part of a "closed loop" control system. In the "closed loop" control system, the control device does not operate independently of the performance of the system or machine being controlled as does the *open loop* system; rather the operation of the control device is part of the function of the actual performance of this system or machine being controlled. Some of the output (heat in the room) is fed back by virtue of the thermostat, since the movement of the bimetallic strip actuates a switch which controls more or less fuel into the furnace, so in reality the thermostat controls automatically the machinery or equipment, in this case, the furnace. The principles of *closed loop* systems are used in industry in many ways. It is essentially a *feed back* system whereby a small amount of the output is fed back into the input, maintaining an equilibrium within certain limits; in the case of the thermostat, it would be 72 deg. F. or in the case of man 98.6 deg.

The Automatic Factory

According to Snyder, the term *automation* is a new and popular word, which in the past few years has been appearing in various magazines. However, automation is really an old concept. In Philadelphia in 1784, Oliver Evans, a miller, assembled three types of power conveyers into a continuous production line and the result was the world's first continuous process flour mill. A more famous automatic operation was started in Paris in 1801 when J. M. Jacquard produced an automatic loom controlled (believe it or not) by punched paper cards very much like those used in business offices at the present time.

One of the big tasks for us today is to begin developing the concept of thinking in terms of the continuous process for a truly automatic factory, just as in the case of Oliver Evans' mill. His conveyer system brought in the flour in raw form, carried it through different processes converting it to some consumable form, in this case, for human consumption. In the case of discrete articles, such as shell casings or fluid material, such as oil for instance in an automatic factory, of this type would be receiving its raw materials, performing the necessary manufacturing processes, handling them in different ways, and then at the very last packaging them ready for shipment.

If this concept is to be realized, then we must rethink old processes and redesign equipment and machines in terms of their function. The old way of soldering wire in a radio chassis needed to be rethought before automatic machinery could be utilized successfully. The printed radio circuit now in use today is the result of this thinking. This new technology that is developing rapidly makes use, as one author puts it, of redesigning machines by returning to their basic functions or a *bundle of functions* as in the case of the automatic turning machines. For example, the chucking machines with several spindles which revolve about a common center and perform six operations or more at once are the result of that thinking.

Along with the development of single and multiple-purpose machines, have been the scientific computers. Their ability to follow extensive lines of logical reasoning of a fully automatic factory enters the realm of possibility. Believe it or not, a machine has been developed at the present time which will reproduce the skill of a craftsman by recording magnetically the actual motions of the machine tool when operated by a skilled machinist.

As Diebold said in his book on *automation*, there is an enormous difference between a process which merely makes use of automatic controls and the process which is truly automatic. The steel industry, although it uses many automatic devices in rolling steel, etc., is fundamentally at the present time, a batch process; however, Republic Steel, along with Babcock and Wilcox, announced recently a successful continuous process of casting steel. The steel manufactured in this way was better than the conventional method.

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The truly automatic factory must be able to make changes, be used on long runs and short run products, have flexible material handling and machine loading devices. Many factories have some of these elements; even the storage sections of plants have discarded the old idea of dead storage bins and have the stock ever moving toward the production line.

There is at the present time an existing automatic factory in Rockford, Ill., built by the W. F. and J. Barnes Company to make 155mm. shell casings. It covers almost 1,000,000 square feet of floor space, employs only 140 workers including the engineers. This plant performs all operations to manufacture 155mm. steel shell casings from raw steel stock. The raw stock is 6 inches square and 24 feet long. When started through except for inspection it is not touched by human hands. It must be impressive to watch this tremendous plant operate and listen to the sounds of metal being worked in so many ways at such a rapid pace. The control stations in this factory are actually a type of computer mechanism and are interconnected so that trouble in any department is relayed forward and back along the line and the equipment is automatically slowed down or completely stopped as each case requires until the trouble is spotted and corrected. (This is a good example of what is commonly called *feed back*.)

The oil industry is another illustration where rethinking converted the industry from batch processing to continuous processing. The conversion utilized the special characteristics of the *feed back* control in designing continuous processing susceptible to automatic control.

To sum up, automation is not new! But as our economy becomes more industrialized automation becomes more important. The complex new control equipment introduced since the war inevitably has speeded up the evolution of automation, but the rapidity with which automation will be extended from here on will depend upon even better design for control equipment than we enjoy today. In short, the *automatic factory* is not a figment of the imagination or fiction, but a hard concrete fact, and has, as some writers imply, introduced the beginning of the second Industrial Revolution.

Implications for Education

At this point you might well ask the question: What has this to do with education? Does it affect us who train the future citizens? Yes, it has many implications for us as individuals and

as teachers. First of all, through automation there will be more rapid and less wasteful methods of increasing our material well-being. Second, we will be able to perform tasks which were not feasible until now. An illustration would be the handling of radioactive materials through servo-mechanisms. Third, there will be less need for human repetitive work. Machines will do this more than ever before. Fourth, the children, perhaps, are being trained to perform jobs that will not be in existence and not being trained for jobs that will exist. This has certain definite educational implications. Fifth, we will need to spend more time in developing basic abilities which are necessary for easy adjustment to rapidly changing technological conditions. This concept implies a better social understanding and a need for easy readjustment to new situations, for some automatic machinery has made it possible for two men to do the work previously done by 200.

In our own work in industrial arts, we also have some specific implications. First, we will need to develop an increased understanding for maintenance and repair. It is estimated that as industry becomes more automatic, the need for skilled maintenance men will increase sharply. Second, the change from less repetitive work to a more technical understanding of the function of the machine will re-emphasize the importance of developing (*a*) a genuine interest in work, (*b*) a desire to do good work, (*c*) a feeling of pride in one's work. Third, we must provide opportunities for our students to repair machinery and maintain the machines in our shop. Fourth, we should provide opportunities for students to use their ingenuity. Fifth, we must continue to develop and set up situations through group activities to develop social skills. Sixth, we must see to it that our students have had the opportunity to understand and work at some worthwhile leisure activity.

We can sit back now and say we are doing all these things, but are we really?

1. Have we told our students about the shift in energy use from man to mineral power and what it has meant for us and will mean in the future?
2. Have we told our students about the increased output our industries are capable of producing?
3. Have we told our students about the increasingly important role electronics is playing in industry?
4. Have we told our students that some jobs available now will not be available or needed in the future?
5. Have we let our students attempt to solve problems in new and different ways? *Well, if we haven't, maybe we should!*

SELECTED REFERENCES

1. "Are New Machines Cutting Down Jobs?" *U. S. News and World Report*, Feb. 18, 1955, pp. 92–95.
2. Asher, E. J., Tiffin, J., and Knight, F. B., *Introduction to General Psychology* (Boston: D. C. Heath Co., 1953), p. 499.
3. "Atoms and Automation," *Saturday Review of Literature*, Vol. 38:4, Jan. 22, 1955, p. 51.
4. Berle, Adolf A., Jr., "The Democratic Future," *Saturday Review of Literature*, Vol. 38:4, Jan. 22, 1955, p. 15 (Lawyer, Ex-Assistant Secretary of State).
5. Bund, Henry, "Industrial Revolution: Yes or No?" *Saturday Review of Literature*, Vol. 38:4, Jan. 22, 1955, p. 21 (of the Research Institute of America).
6. Chase, Stuart, "New Energy for a New Age," *Saturday Review of Literature*, Vol. 38:4, Jan. 22, 1955, p. 13 (Economist and Publicist).
7. Conant, James B., *Modern Science and Modern Man* (New York: Doubleday and Co., 1953), p. 187.
8. Diebold, John, *Automation, the Advent of the Automatic Factory* (New York: D. Van Nostrand, 1952), p. 175.
9. Editorial, "Automation — Blessing or Curse?" *Life* (issue not known).
10. Kahn, Otto, "Servomechanisms, Human Behavior and the Modern Factory" (a report submitted for Industrial Engineering Course No. 408, N. C. State College, Dec. 1, 1954), p. 16.
11. Kelly, Charles R., "Man as a Control System Element," *Engineering Psychology Notes* (mimeographed, N. C. State College, Psychology Department), p. 24.
12. Kelly, Charles R., "Purpose, Choice and Causation," *Engineering Psychology Notes* (mimeographed, N. C. State College, Psychology Department), p. 9.
13. LaJoy, Millard H., *Industrial Automatic Controls* (New York: Prentice-Hall, 1954), p. 278.
14. Lear, John, "Mechanical Mice with or without Men," *Saturday Review of Literature*, Vol. 38:4, January 22, 1955, p. 19 (former Associate Editor of *Colliers*, now writing for the Research Institute of America).
15. Memoli, "Ignorant of Values," *Saturday Review of Literature*, Feb. 12, 1955, p. 23.
16. Murphee, E. V., "The Revolution of Powers," *Saturday Review of Literature*, Vol. 38:4, Jan. 22, 1955, p. 18 (Petroleum Chemist and Executive, President of the Standard Oil Corp.).
17. Snyder, John T., Jr., "The American Factory and Automation," *Saturday Review of Literature*, Vol. 38:4, Jan. 22, 1955, p. 16 (Industrialist, President and Chairman of the Board of U. S. Industries, Inc.).
18. Weinberg, Nat, "Labor on the Hook," *Saturday Review of Literature*, Vol. 38:4, Jan., 22, 1955, p. 20 (Director, Research and Engineering, WAW, CIO).
19. Wiener, Norbert, *The Human Use of Human Beings, Cybernetics and Society* (New York: Doubleday and Co., 1954), p. 199.

So You Want to Be an Industrial Arts Teacher

E. ST. PIERRE GREAVES

Formerly Industrial Therapist
Henryton Hospital
Henryton, Md.
Now Instructor of Woodworking
Boys Shop Center
P. S. No. 176
Baltimore, Md.

This article is not written with the intent of deterring the ambitions of future industrial arts and vocational education teachers, nor is it intended to give bouquets to persons presently engaged in this field. It is to be hoped that it will serve to stimulate the thinking of principals, supervisors, and all other persons in the educational field who have failed to realize the existing chaotic conditions of the industrial arts and vocational education program. It is further hoped that educators not engaged in the field will open-mindedly attempt to eliminate the dilemma by familiarizing themselves with the philosophy, aims, and probable outcomes of *Industrial Arts and Vocational Education*.

When your college career has ended, there is a feeling of elation. Perhaps you feel that you are about to realize some ambition or reach some predetermined goal. By no means do I wish to imply that you have reached an end result—to the contrary, it is just the beginning, and merely a means to an end. Like many of us, your training will be industrial arts or vocational education, and upon completion you feel prepared and ready to put into practice the

of the *closed loop system*, and that is, the control operates at low energy levels as in the case of the starting switch on the automobile. The energy expended in turning a switch or closing a valve need have no particular relation to the energy that is being controlled.

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At this point you might well ask the question: What has this to do with education? Does it affect us who train the future citizens? Yes, it has many implications for us as individuals and

as teachers. First of all, through automation there will be more rapid and less wasteful methods of increasing our material well-being. Second, we will be able to perform tasks which were not feasible until now. An illustration would be the handling of radioactive materials through servo-mechanisms. Third, there will be less need for human repetitive work. Machines will do this more than ever before. Fourth, the children, perhaps, are being trained to perform jobs that will not be in existence and not being trained for jobs that will exist. This has certain definite educational implications. Fifth, we will need to spend more time in developing basic abilities which are necessary for easy adjustment to rapidly changing technological conditions. This concept implies a better social understanding and a need for easy readjustment to new situations, for some automatic machinery has made it possible for two men to do the work previously done by 200.

In our own work in industrial arts, we also have some specific implications. First, we will need to develop an increased understanding for maintenance and repair. It is estimated that as industry becomes more automatic, the need for skilled maintenance men will increase sharply. Second, the change from less repetitive work to a more technical understanding of the function of the machine will re-emphasize the importance of developing (*a*) a genuine interest in work, (*b*) a desire to do good work, (*c*) a feeling of pride in one's work. Third, we must provide opportunities for our students to repair machinery and maintain the machines in our shop. Fourth, we should provide opportunities for students to use their ingenuity. Fifth, we must continue to develop and set up situations through group activities to develop social skills. Sixth, we must see to it that our students have had the opportunity to understand and work at some worthwhile leisure activity.

We can sit back now and say we are doing all these things, but are we really?

1. Have we told our students about the shift in energy use from man to mineral power and what it has meant for us and will mean in the future?
2. Have we told our students about the increased output our industries are capable of producing?
3. Have we told our students about the increasingly important role electronics is playing in industry?
4. Have we told our students that some jobs available now will not be available or needed in the future?
5. Have we let our students attempt to solve problems in new and different ways? *Well, if we haven't, maybe we should!*

SELECTED REFERENCES

1. "Are New Machines Cutting Down Jobs?" *U. S. News and World Report*, Feb. 18, 1955, pp. 92–95.
2. Asher, E. J., Tiffin, J., and Knight, F. B., *Introduction to General Psychology* (Boston: D. C. Heath Co., 1953), p. 499.
3. "Atoms and Automation," *Saturday Review of Literature*, Vol. 38:4, Jan. 22, 1955, p. 51.
4. Berle, Adolf A., Jr., "The Democratic Future," *Saturday Review of Literature*, Vol. 38:4, Jan. 22, 1955, p. 15 (Lawyer, Ex-Assistant Secretary of State).
5. Bund, Henry, "Industrial Revolution: Yes or No?" *Saturday Review of Literature*, Vol. 38:4, Jan. 22, 1955, p. 21 (of the Research Institute of America).
6. Chase, Stuart, "New Energy for a New Age," *Saturday Review of Literature*, Vol. 38:4, Jan. 22, 1955, p. 13 (Economist and Publicist).
7. Conant, James B., *Modern Science and Modern Man* (New York: Doubleday and Co., 1953), p. 187.
8. Diebold, John, *Automation, the Advent of the Automatic Factory* (New York: D. Van Nostrand, 1952), p. 175.
9. Editorial, "Automation — Blessing or Curse?" *Life* (issue not known).
10. Kahn, Otto, "Servomechanisms, Human Behavior and the Modern Factory" (a report submitted for Industrial Engineering Course No. 408, N. C. State College, Dec. 1, 1954), p. 16.
11. Kelly, Charles R., "Man as a Control System Element," *Engineering Psychology Notes* (mimeographed, N. C. State College, Psychology Department), p. 24.
12. Kelly, Charles R., "Purpose, Choice and Causation," *Engineering Psychology Notes* (mimeographed, N. C. State College, Psychology Department), p. 9.
13. LaJoy, Millard H., *Industrial Automatic Controls* (New York: Prentice-Hall, 1954), p. 278.
14. Lear, John, "Mechanical Mice with or without Men," *Saturday Review of Literature*, Vol. 38:4, January 22, 1955, p. 19 (former Associate Editor of *Colliers*, now writing for the Research Institute of America).
15. Memoli, "Ignorant of Values," *Saturday Review of Literature*, Feb. 12, 1955, p. 23.
16. Murphee, E. V., "The Revolution of Powers," *Saturday Review of Literature*, Vol. 38:4, Jan. 22, 1955, p. 18 (Petroleum Chemist and Executive, President of the Standard Oil Corp.).
17. Snyder, John T., Jr., "The American Factory and Automation," *Saturday Review of Literature*, Vol. 38:4, Jan. 22, 1955, p. 16 (Industrialist, President and Chairman of the Board of U. S. Industries, Inc.).
18. Weinberg, Nat, "Labor on the Hook," *Saturday Review of Literature*, Vol. 38:4, Jan., 22, 1955, p. 20 (Director, Research and Engineering, WAW, CIO).
19. Wiener, Norbert, *The Human Use of Human Beings, Cybernetics and Society* (New York: Doubleday and Co., 1954), p. 199.

So You Want to Be an Industrial Arts Teacher

E. ST. PIERRE GREAVES

Formerly Industrial Therapist

Henryton Hospital

Henryton, Md.

Now Instructor of Woodworking

Boys Shop Center

P. S. No. 176

Baltimore, Md.

This article is not written with the intent of deterring the ambitions of future industrial arts and vocational education teachers, nor is it intended to give bouquets to persons presently engaged in this field. It is to be hoped that it will serve to stimulate the thinking of principals, supervisors, and all other persons in the educational field who have failed to realize the existing chaotic conditions of the industrial arts and vocational education program. It is further hoped that educators not engaged in the field will open-mindedly attempt to eliminate the dilemma by familiarizing themselves with the philosophy, aims, and probable outcomes of *Industrial Arts and Vocational Education*.

When your college career has ended, there is a feeling of elation. Perhaps you feel that you are about to realize some ambition or reach some predetermined goal. By no means do I wish to imply that you have reached an end result—to the contrary, it is just the beginning, and merely a means to an end. Like many of us, your training will be industrial arts or vocational education, and upon completion you feel prepared and ready to put into practice the

methods of teaching which were instilled in you during the past few years. Your first step is to seek a position.

After prolonged letter writing and suspenseful waiting, you finally receive an encouraging reply, usually requesting a personal interview. In succeeding favorably to impress the superintendent, supervisor, or principal (the interviewer) that you are thoroughly qualified as an industrial-arts teacher, and capable of diversified skills, you are assigned the position. This, I assure you, is the beginning of your training in "Modern Misconceptions of Industrial Arts and Vocational Education."

Little do you realize that you have just lost your professional status as a teacher and acquired the new title, "shop man." In most instances you will be introduced to co-workers and members of the staff in the following manner: "This is our new *shop man.*" Perhaps in record time you will acquire several other titles such as, "the carpenter," "mechanic," "manual training man" or even "wood butcher"; but be not dismayed by so insignificant a thing when there are so many more important things to follow.

In preparation for your first assignment it is natural to review your methods of ideal instruction, painstakingly prepare an elaborate course of study and a master lesson plan. You clearly consider the philosophy of your program, its aims, and its goals. Now you are ready to work. (So you think.)

If you are one of the unfortunate (as many of us are or have been) you will find your shop lacking tools, materials, and equipment. Your inquiries about the prevailing conditions will merely reveal that the institution's budget has been exhausted because all of the funds were used for music, science, physical education, mathematics, and all other departments, thus leaving no money for the industrial arts and vocational education program; however, you might be promised that the budget *will try* to save you $75 to $100 next year. At this point you are informed that you and "your boys" might keep busy by repairing the broken desks, chairs, and windows. Here you wonder does anyone in this institution know the definition of *Exploitation*, and into your file 13 go your elaborate course of study and your master lesson plan.

The school or institution to which you have been assigned will likely have audio-visual equipment, broken down and antiquated; nevertheless, as "shop man," in addition to your duties you and your department will be delegated the responsibilities of operating and maintaining the equipment. In addition to your delegated duties, there will be a constant influx of requests for repairs from the students, faculty, and the laymen of the community. These repairs might range from attempting to repair a most delicate watch to making a splint for a broken-legged grasshopper in the science department.

After school hours, there is always a co-worker who has, what he calls a *10 or 15 minute* job, which he says he could do himself but doesn't have the tools. Naturally you consent to lend a hand, only to find that the little job is a delicate antique which has several intricate pieces missing. After two weeks of your diligent work you finally complete the *little job*, gratis of course. To add insult to injury, several days later the same co-worker returns lamenting over the fact that he had to pay the Wreckum Construction Company $35 for 2 hours they took to build a box for you, or (of course) he didn't think you had the time — besides, you (underpaid) didn't need the money.

Be it conspiracy or not, suddenly your fellow teachers will decide that they have several incorrigibles, delinquents, and general undesirables with whom they have tried to adjust through the counselor, psychiatrist, psychologist, and everyone else except the State Penitentary Warden, but to no avail. So, with the approval of the principal (and he usually approves), "Let's send them to that new *shop man.*" Theme: "Dump your burdens on that shop man and leave them there." Now, you are challenged with methods of instruction that you didn't learn in school. What are you going to do? Here you become cognizant of the additional courses you should have been taught in your preparation for an industrial arts or vocational education teacher. Your techniques of teaching will depend on your innate judgment employing philosophy, psychology, psychiatry, ethics, law, anatomy, bacteriology, music, dramatics, and even astrology. Above all, use tolerance.

Supervised Teaching

JOSEPH J. LITTRELL
Assistant Professor of Industrial Arts
Nebraska State Teachers College
Peru, Neb.

One of the supervisor's most difficult functions is to evaluate and grade the student teacher. When the college senior arrives for his first day of practice teaching he is generally quite nervous. There is good reason for this as he has been preparing for three or three and one half years for just what he now faces, meeting the class for the first time. Much depends upon this semester's work of practice teaching. Not only the experience of working with his first class, but the student teacher wants to earn a respectful grade and please the supervisor. These are important since he wishes to obtain favorable recommendations in order to secure a good teaching position the following year. For the prospective teacher this will probably be the most important credit he will earn in his college work.

Getting off to a good start is necessary for the student teacher, as it is for any teacher. If emphasis is put on planning the work before meeting the class, the teacher knows what he is going to do. He can practice and go over everything he needs to have. Adequate preparation means more confidence on his part. Consequently more learning should take place by the pupils as well as the student teacher and his experience is more likely to be pleasant. It often happens that a teacher will decide to quit teaching after only one year. Discouragement and the regular pressures of teaching may give him the feeling of failure or that *it just isn't worth it*. The same feeling might be expected during

the college senior's practice teaching. It is true that many find, and rightly so, that they should do something besides teach, but many good prospects are lost at a time when good industrial-arts teachers are needed.

It is a good idea for the student teacher to know well in advance in what phase of industrial arts he will be doing his teaching. Knowing what he will teach, he should be encouraged, by directed reading, to try and get a general idea of what should take place in such a class as he will be teaching. Certainly he will have had some class experience in this area, but it will take on an entirely different meaning to him now that he will be the teacher instead of the pupil.

Whether the student has had his special teaching methods before or is taking them at the time of his teaching, it is important that he learn to plan a program very carefully for this particular class that he will soon be teaching. It is helpful to the student to observe the supervisor for some time. If the supervisor has a general plan for approximately the first nine weeks work and lets the student plan the rest of the course, the student should have more confidence in himself and will do a better job. Students are generally unsure of their planning ability at first. By observing the supervisor's planning and teaching for at least two weeks (this time depends upon the student and varies considerably), then continuing with the teaching at some opportune time, they should step into a smooth running class. It is then a matter of just *easing in*.

During the two weeks they are observing, students can be preparing for the time they will be in charge of the class. They can make the projects, prepare demonstrations, teaching aids, and be doing their planning. During the actual class time they should observe, get acquainted with the students, and occasionally help them with small jobs. It is an adjustment time during which the students and the student teacher get to know each other. It is not fair for the supervisor to walk into the class the first day, introduce the student teacher and walk out, leaving him to the mercy of the class, or the class to the mercy of the student teacher. There is a responsibility to see that the pupils learn as well as for the college senior to get his practice teaching experience. It is, therefore, important that the supervisor go over the part of the planning that the teacher does before the time it is to be used. If it is not satisfactory there should be ample time for it to be remedied. This planning should include tests, instruction sheets, and the like, as well as assignments.

At the outset, the practice teacher should be informed that he will be expected to take the initiative, and this means extra time will be needed to prepare the many things essential for effective teaching.

For my own supervised teaching, I not only try to go over classroom procedures and teaching techniques with the students, but have divided the teaching instruction into three divisions; preparation, discipline, and ethics.

Following is a sample of material given to each student. They keep these, along with other materials given, and materials they obtain for themselves, to form a notebook. It is hoped that when they leave after the semester's work, they will have something that will be of value and use to them later.

Preparation

1. Check roll daily.
2. Make a seating chart (have some definite place for the boys to be when you want to talk to them).
3. Submit a semester outline to the supervisor.
4. Make a more detailed work plan for at least one week in advance.
5. Plan for your classroom work (demonstrations, discussions, etc.).
6. Divide above work as evenly as possible. Try to give it though at the time it will mean the most.
7. Plan for tests and make them out well in advance.
8. Practice teachers in industrial arts are expected to make the project before the pupil does.
9. Make use of visual aids.
10. Keep a constant check on tools and equipment.
11. Turn in a material list of all material that each boy receives.
12. Practice your demonstrations first.
13. Have materials and tools ready for each class period.
14. Request any replacement of equipment or material you feel is necessary for your class.
15. Grades are given to campus school children every nine weeks.

Advanced photo student Benson Vann mixing photo chemicals. Photo by Colleen Brown. Submitted by Harry A. Goldstein, graphic-arts instructor, Tucson Senior High School, Tucson, Ariz.

Discipline

1. Know where every pupil is at all times.
2. Keep all boys occupied at all times.
3. Keep the teacher-pupil relationship on just that basis.
4. Do not permit excessive talking.
5. Keep your own voice down when talking.
6. Do not permit horseplay or whistling.
7. Be firm but fair with your pupils.

Ethics

1. If it is necessary that you be absent from class, let your supervisor know at least 24 hours in advance — longer if possible.
2. Make some improvement in the shop (tool cabinets, visual aids, etc.).
3. Practice teachers are expected to have regular conferences with their supervisors. (Make arrangements for these.)
4. Be willing to accept criticism that is intended to help your teaching.
5. Do not *gossip* about your pupils.
6. Attend meetings requested (PTA, faculty, etc.).
7. Get to class early not late.

The evaluation and setting of grades for student teachers is difficult because of the likelihood of personality influences. Attempting to grade as objectively as possible I inform each student at the start as to how he will be graded. Following are points on which he can be expected to be graded: these are discussed with him in conferences whenever possible.

1. Personal appearance
2. Demonstrations
3. Attitude (teacher's)
4. Poise
5. Discipline
6. Leadership
7. Neatness (room)
8. Equipment
9. Attendance
10. Course outline
11. Class discussions
12. Tests
13. Subject matter
14. Familiarity
15. The boy

Vocational Education at the California Institute for Men

L. G. WINES
Supervisor of Vocational Instruction
Department of Corrections
California Institution for Men
Chino, Calif.

(Continued from page 211 of the September, 1958, issue)

Machine Shop — W. C. Hill; Instructor

The Machine Shop is equipped to provide complete bench work and machine operation instruction essential to employment. It offers training opportunities on basic and advanced levels with facilities for 20 men.

The equipment of the shop is representative of the industry and includes turret lathes, hydraulic and mechanical shapers, milling machines, tool and cutter grinders, radial arm drill, and cylindrical and surface grinders. In addition a separate room is equipped with heat treating furnaces, forge and nonferrous furnace. Practical experiences are provided through the institutional maintenance function. Here, too, education and engineering co-operate on a mutually beneficial program. Other State agencies, also, have found need for the skills and craftsmanship of trainees and have augmented the practical aspects of the training with their projects.

As in the case of all shops, machine shop students have lecture room facilities for related instruction and applicable visual aids.

Office Machine Repair — Richard Iahn; Instructor

Expansion of vocational instruction at C.I.M. has created training opportunities for those men, who qualify, in a new and growing occupation. Designed to instruct men in principles, repair, overhaul, refinishing, and servicing office machine equipment, and organized with the full co-operation of the Southern California Office Machines Dealers Association as trade advisory members, a new and unique area of employment has been opened.

Included in the shop facilities is a completely modern cleaning room, a fully equipped spray room, infra-red oven and an individual work station for each trainee.

Here again is a training program made possible through co-operation with Correctional Industries and other State agencies. Through revolving fund procedures the repair of State owned equipment is accomplished at savings to the respective State Agencies.

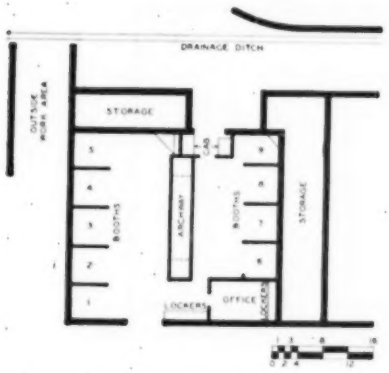
Most recently colors in pastel have been introduced into the refinishing phases of training. Augmenting the formal instruction is a program of service. This phase introduces men into the field of servicing machines on location. Assuming responsibility for the operation of institutional machines, the instructor assigns trainees to duty and supervises their activities. Thus the trainee experiences servicing situations with which he might be faced in an employment situation outside the institution.

Plastering — Ray Coppersmith; Instructor

Contributing to the training opportunities of the building trades is plastering. This shop is constructed with a series of booths, each varying in degree of difficulty in the learning process. Twenty men are instructed in a 7 hour class held daily. The basic class is taught fundamentals of tool manipulation. Using a temporary type mortar

Machine shop

T.L. — Turret lathe; E.L. — engine lathe; B — bench; B.G. — bench grinder; H.S. — Hack saw; C.G. — cylindrical grinder; S.G. — surface grinder; T.G. — tool grinder; R.F. — rotary file; B.S. — band saw; U.M. — Universal mill; H.M. — horizontal mill; V.M. — vertical mill; D.P. — drill press; S — shaper; A.P. — arbor press; W.B. — wash basin; Cab. — cabinet



Plastering shop

composed of sand and lime they begin on flat wall surfaces, progressing to combinations of surfaces as they advance. Advanced students continue progressively to irregular areas, columns, concave and convex surfaces, scaffolding and finish mortar applications. Advanced men correlate shop instruction with practical maintenance experiences within the institution. Technical related instruction and visual aids supplement the manipulative training.

Sheet Metal — Richard Tucker; Instructor

Eighteen men are enrolled in training to become employable as sheet metal men. This vocational shop provides instruction and practical experience situations in all phases of the trade. Beginning with the basic skills of the trade men advance into the more complex operations of the occupation.

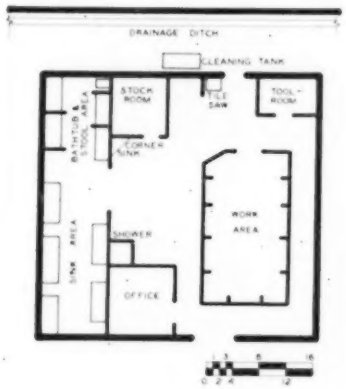
Related technical knowledge is provided and correlated with shop experiences and drafting room procedures. Realizing that practical training is an essential ingredient in training, this shop assumes full responsibility for sheet metal maintenance in the institution.

Radio-TV Repair — Felix Hunt; Instr.

Following a careful screening which includes aptitude, dexterity, scholastic achievement and interest tests, eligible men are enrolled for intensive training in theory and application of principles of repair and maintenance.

Designed to provide basic skills this trade offers opportunities for initial entry into the field of radio and television repair.

This is a relatively new training opportunity for our men. It has the support of industry and dealerships and promises to open the door to employment from any C.I.M. men qualified to participate.



Tile setting shop

Tile Setting — E. W. Carls; Instructor

Another building trades training opportunity is tile setting. With instruction provided for 20 men, the tile setting is unique in the techniques employed. Beginning with the basic tool processes, trainees tile flat wall surfaces continuing to more difficult installations including drain boards, shower walls and ceilings, jambs and dams, lavatories, wash basins and baths. Complete pullman settings are tiled. Emphasis is placed upon the application of ceramic tiles. Instructional settings are accomplished with temporary mortar. Practical experiences are recognized as an essential part of the instruction. Institutional maintenance provides this aspect of training. Here opportunity is afforded to apply tiles utilizing both mortar and mastic setting techniques. Introduction is made into tile substitutes and methods of setting as a means of augmenting the related technical knowledge phase.

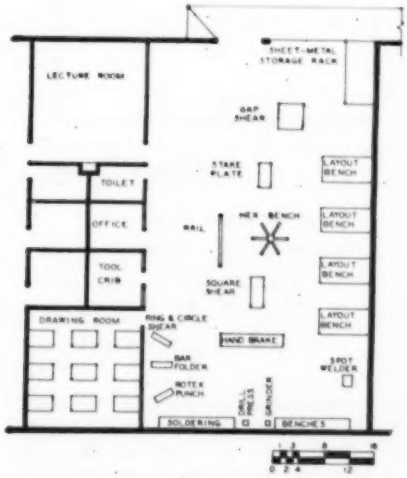
Welding — J. A. Stevens; Instructor

The welding course has played an important role in preparing men for release employment. It provides related skills basic to the metal trades as well as preparing men for entrance or return to welding as a trade in itself. In addition to a battery of arc welding machines, both a.c. and d.c. equipment is provided for complete instruction in oxyacetylene welding and cutting, radical cutter operation, and heliarc techniques. Equipped to instruct a class of twenty men in the activity provides related technical instruction and practical application for skills attained. In addition to serving in a maintenance function for the institution, the shop services the needs of other State Agencies whenever it is called upon to do so. On the job training:

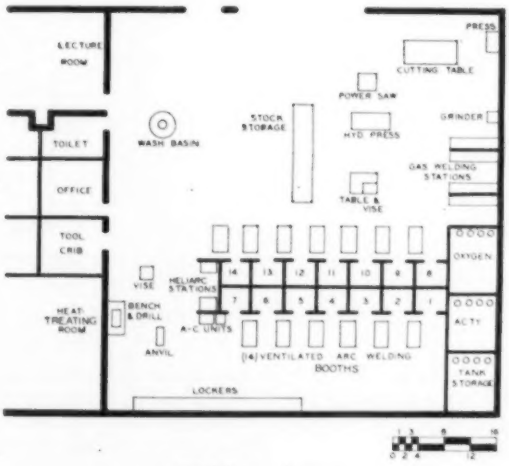
Baking — A. Balizs; Instructor

One of the on-the-job activities is commercial baking. Providing trade instruction for 20 men interested in continuing baking as release employment, this program provides necessary related knowledge and training in skills.

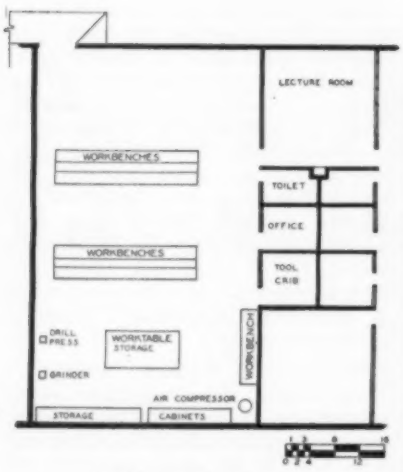
The class is responsible for the production of all baked goods consumed by inmates and personnel. In addition, it



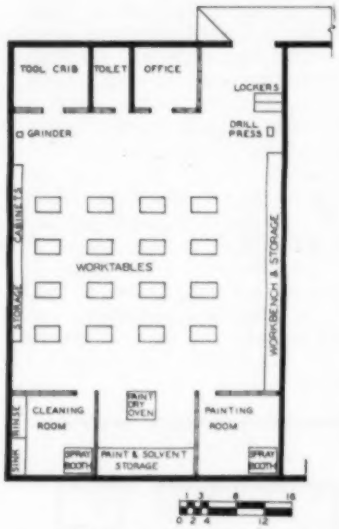
Sheet-metal shop



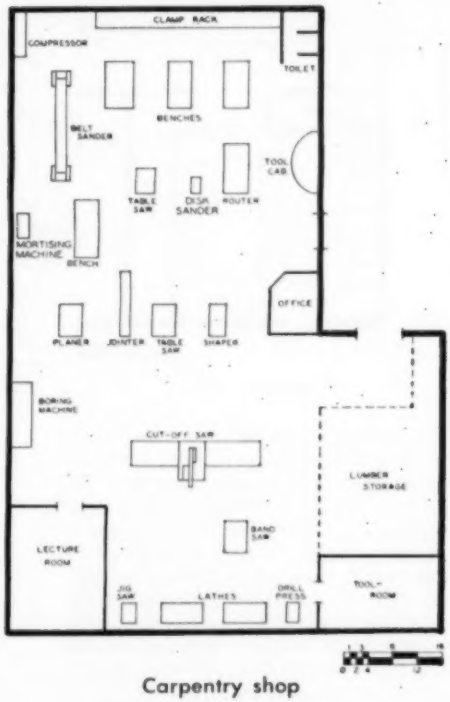
Welding shop



Radio-TV electronics

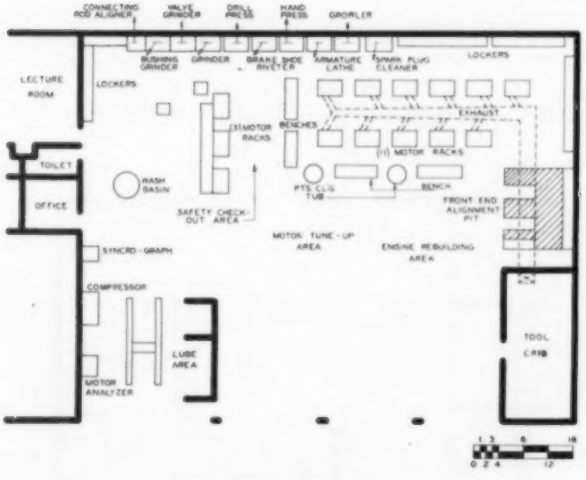


Office machine repair

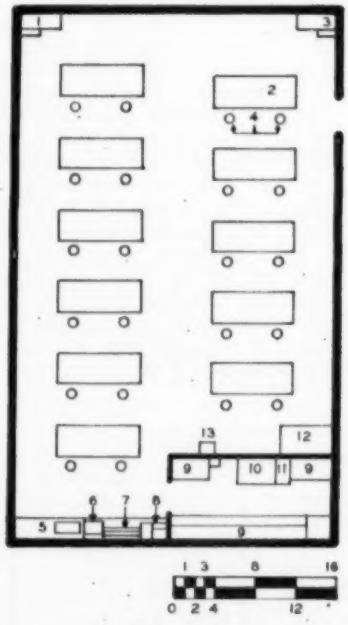


Carpentry shop

Bricklaying shop



Automechanics shop



Drafting room

1. Technical library; 2. two-student desk (11); 3. magazine cabinet; 4. stool (22); 5. sink; 6. paper cutter; 7. paper dispenser; 8. student work cabinet; 9. cabinet; 10. desk; 11. filing cabinet; 12. table; 13. typewriter and table

supplies baked commodities for C.I.M. hospital and for men confined in the Reception-Guidance Center — Southern Branch located at Chino.

Shoe Repair — A. Hausman; Instructor

Responsible for the repair and maintenance of all inmate footwear both at Chino and for road and forestry camps associated with C.I.M., 18 men are engaged in preparing for release employment as shoe repairmen.

The instructor provides related technical instruction in addition to trade skills. All types of shoes including work and dress shoes are repaired. Here, as in all trade classes, the instructor feels the inner satisfaction of having so prepared his students that they are able to

enjoy success in their chosen field when released to free society.

A recently completed building program which provided for 36,000 square feet of shop space has provided for future expansion.

Throughout, we have stressed the vocational opportunities provided through organized classes. Since the education program of C.I.M. is voluntary, some men have no desire to participate in its offerings. For these men a schedule of full time institutional work is provided. Even in the full time work program vocational training is being accomplished. Each and every work crew supervisor responsible for a group of men is a skilled worker in his field. Hence, instruction is being provided as he offers his knowledge to men under his supervision. Therefore it is essential that we recognize vocational training as part of the daily activities in the dairy, cannery, furniture factory, farm, engineering, maintenance, feeding, laundry, slaughterhouse, poultry and rabbitry, and many other areas where men benefit by informal training experiences.

It has often been said that individuals are admired and respected not because of what they are but rather because of their inspiration to others through believing in them, seeing the good in them, and lending a helping hand when needed. Certainly the men of Chino have reason to believe in the philosophy of freedom displayed by Chino administration which offers encouragement and helpfulness coupled with the desire to raise the standard of living of each of its inmates through academic and vocational education.

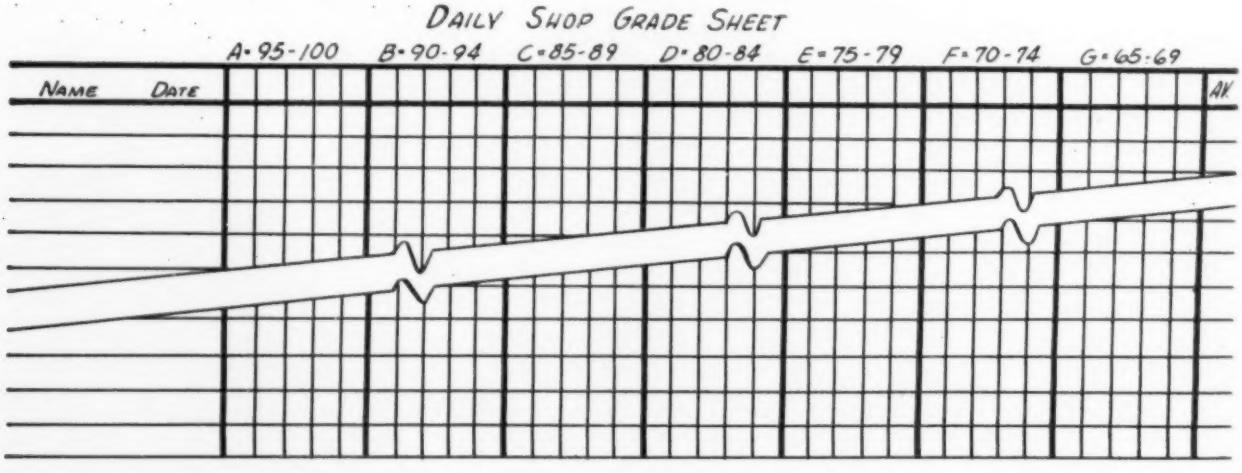
Daily Grades for Shopwork

BROTHER LEO GEIGER, C.S.C.
St. Edward High School
Cleveland, Ohio

Many shop instructors grade their students upon the completion of each project or use some variation of this method; such as having the entire class grade each project or having the individual student grade his own project with the assistance of the instructor. This system considers the accuracy and appearance of the project but may or may not consider the time involved, material wasted, or tools improperly or carelessly used. The instructor may have observed a capable student deliberately wasting time or making a mistake in his work, but these are generally forgotten by the time the project is completed and ready for grading. A *better student* can often waste much time during the shop period and still complete his work before the *less gifted student* finishes his.

The daily grading system is an incentive to stimulate the students to work to their capacity. This system helps to place the shop on an industrial basis where the student is daily held responsible for the work produced. The daily grade corresponds to the wages of industry where a careless or incompetent worker soon pays the price for poor work or wasted time.

For example: Johnny is building a coffee table. During the process he spends half a shop period in a corner talking to a friend or prevents someone else from working by repeated disturbances. He may cut one leg too short and so be forced to make a new one, or he must cut all the legs shorter than the specifications on the plans. Still he might carelessly use his tools or machines improperly with a possibility of damaging the tools or producing a shop safety hazard. None of these may be apparent when Johnny takes the finished table to the instructor for grading. This does not mean the instructor is ignorant of Johnny's failings, but he may have forgotten them during the ensuing weeks spent in the shop while Johnny is working on his table. Johnny may receive an excellent grade for a job apparently well done.



Suppose this instructor had been using the daily grade system in his shop. First of all he would be forced to check on each student every day in order to be able to record a grade for the day's work. When Johnny wastes time or makes some mistakes, the grade for that day is lowered accordingly. The next day when he sees the grade on the bulletin board, Johnny will want to know the reason. Here is where the instructor can supply the individual guidance by explaining the reason for the lowered grade and what must be done to prevent a recurrence.

To the poorer student who never seems to do anything right, an occasional raising of his daily grade sends him into the shop smiling, thinking, "Maybe this shop isn't so bad after all."

Each day as the student enters the shop he can check his grade for the previous day's work. This enables him to see just how he is progressing. This system also tends to reduce subjective grading by an average grade covering all the shop days in the grading period.

Once an instructor has used a daily grading system for a period of time, he will be able to quickly check each student several times during a shop period and be able to record the grades in a few minutes after the shop period is ended. If the grades are recorded when the students are still present, there is likely to be mass confusion as each student will wish to see what grade he received and ask why it wasn't higher.

Some instructors do not wish to use the daily grading system because they fear the complaints of the careless, lackadaisical students who feel they are being discriminated against when they receive what they deserve. Other instructors feel a student's grades should not be published or made common knowledge by placing them on the bulletin board. Here it must be remembered that each student in shop is working in full view of the entire class. Each knows what the other is doing and is capable of doing. A poorer student may watch a better worker to see what he is doing to deserve the grade he receives. If an instructor wishes, he can give the students performance tests on the use of various tools and machines, or he may give written quizzes covering the related material that accompanies the shop work. These test grades can be recorded in a grade book and later averaged with the shop grades.

Any shop instructor can design his own daily grade system to be used in shop. The one described in this article is one example of many which could be used.

A special chart can be duplicated with a place for the names of the students in a column on the left and a smaller column for each day of the shop grading period extending across to the right. Seven letters, A to G are used as the grades. If each letter grade is defined at the top of the grading chart, as shown in the example, less confusion would be encountered. The numerical value for each letter is as follows: A = 95–100; B = 90–94; C = 85–89; D = 80–84; E = 75–79; F = 70–74; G = 69–65. This gives a wide range of grading both to show slight improvement as well as failures or negligences. When the end of the grading period arrives and the averages must be totaled, the instructor can simply assign numbers to the letters; six for each A, five for each B, four for each C, and so on down to G which equals zero. Add these substituted numbers and find the average which will generally be a mixed number between one and six. This number can be transformed back into a grade based on the numerical values listed above; each two tenths of a decimal fraction of the average represents a grade point.

Suppose a boy during the grading period earns seven B's, sixteen C's, two D's, and two E's. Allowing five for each B, four for each C, three for each D, and two for each E, this total would be one hundred and nine. There were twenty-seven shop-day grades during the period giving an average of 4.04. Four was the value assigned to C which equaled 85–89. Since the decimal part of the average was less than one tenth, it is dropped, giving an average of 85 per cent.

If the conventional letter grades are given instead of the numerical as shown here, the individual instructor can adapt the letter grade on the daily chart to comply with his grading system.

Military Insignia— What Do They Mean?

JOSEPH DRIES
Lt. Col. U. S. Army
U. S. Army Military District, Wisconsin
Milwaukee, Wis.

A red diamond-shaped patch worn on the caps of the Third Division of the Army of the Potomac, commanded by Gen. Phillip Kearney, during the Civil War, was apparently the first instance of our military services' use of insignia to identify an individual unit. The first American awarded the French Legion of Honor while fighting under the French flag, Gen. Kearney probably adopted the idea of a unit insignia from Napoleon, who recognized the importance of distinctive uniforms, insignia, and decorations.

The use of distinctive insignia to build pride in outfit has assumed great importance. "When green units have come to feel a sense of confidence in themselves," a ranking American officer wrote, "one of their first acts is to search for something distinctive to wear."

Insignia of one kind or another have been worn or displayed longer than mankind can remember. Prehistoric tribes were known by their emblems — the bear, the fox, the eagle. Knights of the Middle Ages, although their faces were hidden behind steel visors, could be recognized by the designs on their shields. In modern times, clubs and fraternities have their pins and badges. Every state and nation has its flag and seal.

Insignia Are Symbols

Insignia, in fact, are symbols, and, of course, symbols often are more effective than written labels. The red-striped barber pole attests to that.

Armed forces insignia are of varied kinds, shapes, colors — usually easily visible at a distance. They show principally grade, branch of service, or job assignment and unit.

Since the Continental Army early in the Revolution unfortunately had no uniforms, its soldiers had no convenient means of recognizing their leaders. Gen. George Washington therefore ordered sergeants to sew a strip of bright red cloth on their right shoulders, and corporals a green strip. Field grade officers wore red cockades in their hats; captains, yellow, and subalterns (lieutenants), green. Washington himself wore

a "light blue ribband" across his breast, while other generals wore purple or pink ribbons.

Throughout the years the armed services gradually developed their own symbols of grade. Officers at different times wore fringed shoulder knots, then shoulder straps, and finally embroidered or metal insignia. In general, the Army, Air Force, and Marines now use a similar system of grade insignia, and the Navy uses another system.

The metal insignia of officers' grade, however, are similar for all services. An Army major, an Air Force major, a Marine major, and a Navy lieutenant commander all wear the gold oak leaf, but those worn by Navy and Marine officers on their shirts are smaller.

The stars used by generals and admirals date from 1780. The colonel's eagles date from 1832, and most other officers' leaves and bars, from 1836. The stars indicate high or controlling position, the eagle is patterned after the American eagle, well known for its courage and commanding appearance. The oak leaf, like the oak tree, is a symbol of strength. The bars of silver and gold are much like those used on knights' shields.

Why Silver Insignia Outrank the Gold

Why does silver outrank the more valuable gold? Why does a lieutenant colonel's silver leaves outrank a major's gold ones? It seems that at one time a colonel's eagles were made in both gold (for Infantry) and silver (for other arms and services). When they were standardized, most of the colonels had silver eagles; so, as a matter of convenience, silver became the standard metal for colonels' insignia. This precedent established silver as the ranking metal for insignia adopted later. Although the Navy had warrant officers, there were none in the Army until 1920. The rank of Navy and Coast Guard officers is shown by sleeve stripes of braid or by shoulder marks, often called shoulder boards. Also showing rank this way are members of the U. S. Maritime Service, the Public Health Service (when in Navy uniform) and the Coast and Geodetic Survey.

Enlisted insignia of grade in all services now use chevrons — one, two, or three of them. To show grade above three chevrons, their ends are joined by one or more arcs. At one time bars also were used.

In the Army and in the Marine Corps, the point of the chevron is always up; in the Navy and the Air Force, it is down. In the Navy before a sailor earns a petty officer rating (E-4 and above), he wears white or blue diagonal stripes on only the upper left sleeve if he is a seaman, hospitalman, dentalman, or steward; red if a fireman (below deck rate); green if an airman, and light blue if a constructionman. The chevron, an ancient emblem, some say was awarded to a knight to show he had participated in capturing a castle, town, or buildings, of which the chevrons resembled roofs.

Service Insignia

In the Army the oldest insignia of service is the Ordnance Department's shell and flame, adopted in 1832. The crossed cannon of the Artillery was adopted in 1836.

The infantry's crossed rifles became a real problem because they kept getting out of date every few years, whenever a new rifle model was adopted. Finally in 1924 the solution was found — the design used thereafter has been that of the original musket issued U. S. troops. The MP's chose for its insignia a very old-type pistol, often called the Harpers Ferry model.

In general, insignia of arm or service try to show exactly what a particular service does. Thus the Transportation Corps's device includes a ship's steering wheel (for water transport), a winged car wheel (for rail transport), and a highway marker shield (for land transport).

Newcomers among insignia are the shoulder *patches*, properly called shoulder sleeve insignia. One of the earliest, was adopted by the Army's 81st Division aboard ship en route to France in World War I. The division, many of whom were Carolinians designed a patch showing a wildcat — an animal common to the Carolinas. Another early division patch was that of the First Division — simply the red figure "1" on a dark background. In World War I this division was the first to reach France, first at the front, and first to suffer casualties.

Division insignia, like *distinctive insignia*, sometimes show something of a unit's record. The Third Division's insignia bore three white stripes, to show not only its number but the fact that it participated in three major battles in World War I.

The Swastika Changed to a Thunderbird

The swastika, chosen by the 45th Division in 1924, was understandably changed in 1939 — to a thunderbird, Indian symbol of happiness. The 101st Airborne Division adopted an eagle's head because of the tradition that an earlier Wisconsin Regiment of that number had carried a pet eagle into battle.

Today, more than 12,000 Wisconsin National Guardsmen of the state's famed 32nd *Red Arrow* Infantry Division wear the red arrow shoulder patch. The red arrow insignia was born in World War I in France when the 32nd was pushing hard to pierce the Hindenburg Line. The division's commander, Gen. Hahn, was urged by a subordinate to adopt an insignia for the outfit. Days later, during a hectic referral to a map, which was overlaid with red arrows to designate points the division was to attack, Gen. Hahn spontaneously handed one of the red arrows to the subordinate officer with the remark, "There's your insignia, let's see what we can do with it."

Some 4000 Army reservists, members of Wisconsin's own 84th "Railsplitter" Infantry Division, wear a patch showing an ax splitting a log. Because it was filled with men from the upper Great Lakes area, the 84th chose the "Railsplitter" name and insignia, harking back to Capt. Abraham Lincoln's service in the Black Hawk War.

Shoulder insignia sometimes indicate membership in units larger than divisions, such as corps or armies. Most corps insignia use blue and white, the color of corps' flags. Armies often use red and white, the colors of the army flag. The insignia of the 5th Army, which comprises the 13 midwestern states, including Wisconsin, shows a mosque, for North Africa, the area in which it was activated in early 1943.

Oversea theaters also have insignia showing something of the nature of their duties. The shoulder insignia of SHAEF (Supreme Headquarters, Allied Expeditionary Force) bears the colors of the United Nations' flags, together with blue (symbolic of hope) for peace, a sword and flames to represent avenging justice, and a black field to represent Nazi oppression.

The Navy adopted four shoulder insignia during World War II but abolished them in 1947. They were worn by Amphibious Force personnel, PT boat crews, Seabees and minecraft sailors.

The Air Force shoulder insignia has one basic design, with variations for its different commands. The basic design was taken from the original emblem painted on Army aircraft — a blue circle and white star, on which was a red disk. Golden-orange wings were added.

The Marine Corps used a number of shoulder insignia, many with red — the Marine's color — in the background. The first design adopted was that of the First Marine Division. It was often called the "Guadalcanal" in white letters against a blue background bearing the stars of the Southern Cross.

Insignia on a soldier's, sailor's, airman's or marine's sleeve may show length of service. It takes a soldier or airman three years, and a sailor or marine four, to get a "hash mark" — a

diagonal stripe on the lower part of the left sleeve. In addition, service overseas by a soldier or airman is shown by a small gold bar on the left sleeve — one for each six months in World War II.

On some World War I soldiers, you will see small gold chevrons, with the point downward, just above each sleeve end. If worn on the left sleeve, each chevron stands for six months of oversea service; but if worn on the right sleeve, it is a wound chevron.

In the Army each arm, service, or bureau has its color or colors, worn to edge garrison caps or in other insignia. As might be expected, the older Army services have the single colors — Infantry, light blue; Cavalry, yellow; and Artillery, red. The Air Force uses a cord of two colors — ultra-marine blue and golden orange.

Cap insignia are used by all services. The U. S. coat-of-arms in gold is used by the Army, and in silver by the Air Force. Navy officers wear a cap device of crossed anchors, a shield and an eagle. As late as 1941 it was discovered that the Navy cap eagle was facing left instead of right. So the device was changed to face right. An eagle facing right is, supposedly, facing the wearer's sword arm.

The Marine Corps cap insignia depicts an eagle sitting on top of the world, behind which is an anchor entwined with rope.

Insignia on Buttons

Each service uses different buttons. All Army personnel wear buttons bearing the U. S. coat-of-arms, except officers of the Corps of Engineers who may wear their old and traditional button showing a flying eagle holding a scroll inscribed "Essayous" ("Let us try").

Navy officers wear guilt buttons bearing an eagle perched on an anchor. Enlisted men, except chief petty officers, wear black buttons bearing a foul anchor and a rope.

The Marine Corps button, said to date back to the 1790's, shows an eagle and an anchor.

The Air Force adopted a distinguishing button — it is edged with 13 stars and bears the USAF coat-of-arms in the center.

Armbands, called brassards, are worn around the left sleeve above the elbow for special purposes. Military police wear an "M.P." band and the shore police "S.P." Air police wear a brassard bearing the full title "Air Police." The recruiting services as well as acting officers and noncoms in officer candidate schools wear distinguishing arm bands.

Many people are curious about the significance of the handsome loops of gold or colored cord draped around the shoulder of some servicemen. Some, called aiguilettes, are worn by aides to the President of the United States, or by aides to visiting foreign officers, secretaries of the armed forces, general or flag officers.

A different cord, called fouragere, was originally a French decoration begun by Napoleon. During World War I the French awarded it to 15 American organizations in France. Members of the original units may wear the fouragere, no matter where later assigned. Others may wear it only while assigned to the unit.

Although military and naval insignia are sometimes worn by persons not in the service, the insignia of the armed services are not jewelry. A fine of $250, or a prison term, or both, can be given anyone illegally wearing such insignia.

While miniature metal insignia are worn on the shirt by Navy and Marine Corps officers and is optional with the Air Force, no Army personnel except general officers may wear them. General officers of high grade may do so, partly because three or four large stars cannot easilly be worn on a collar.

A reader recently wrote a Wisconsin newspaper, "I believe General X is out of uniform in your picture, as he has no 'U. S.' on the lapels of his jacket."

Actually, the general was not out of uniform, since he was a four-starred general, and general officers of this grade may prescribe their own uniforms.

Military insignia, properly designed, always face the front, considered to be the point of danger and the point of honor. This is true of both shoulder and collar insignia and shoulder sleeve insignia. Even unit flags with designs on both sides must have the design on each side facing the front when carried.

Every man and woman in the armed services has the sworn duty to be worthy of the insignia — and the uniform — which he wears.

Hands and Metal

DR. W. SCHWEISHEIMER
Highland Hall
Rye, N. Y.

Protection of Both: Skin and Product

An interesting discussion was seen recently in the *Journal of the American Medical Association*. An industrial plant in California had twenty skilled precision workers engaged in the manufacture of small metal objects or precision parts used in aircraft. These parts are composed of various materials.

Perspiration Stains on Metal

Four of the workers, after handling these parts, had left stains from perspiration from their hands and this had caused corrosion of the metals. Several buyers of these parts had shipped them back because of the corrosion. The industrial physician of the plant asked the *Journal* for advice which treatment would alleviate the condition of these workers or whether any protective measures would be helpful.

The *Journal's* expert replied that the condition of the skin is dependent on perspiration or, instead, may be influenced by residual soaps due to faulty rinsing. The palm surfaces of both hands and fingers are usually more acid than other portions of the body. The skin's acid state is much decreased during winter so that the difficulty described may disappear spontaneously during the cold months.

The following steps are recommended by the *Journal's* expert: (*1*) find out if cold weather has, for the season, eliminated the difficulty; (*2*) make sure that adequate rinsing follows use of soap; (*3*) institute hand washing with any cake soap at two hour intervals, to be followed by adequate rinsing and drying.

4) If those measures are of no avail, then provide for hand application only any of the many commercially available antiperspirants (not deodorants). They may be used in nongreasy form as powder or liquid. Those antiperspirants need not be applied during working hours but, if desirable, only at home. The control of the condition is more difficult in women than in men.

If all of these measures should fail, the *Journal's* expert says, there are available commercially, anticorrosion solvents though their application to the finished metal part adds to the cost of the product.

Hands of Metalworkers Are Poorer on Germs

A strange observation has been published by Drs. I. Lominski and G. R.

Thomson in the *British Journal of Industrial Medicine*. They found the hands of steel and metalworkers poorer on germs, or more sterile than that of the average man or worker. They studied the kind and number of germs present on the hands of men working with engine oil and metal filings, and they found markedly fewer germs (bacterias) in comparison with men working with either oil or filings alone.

The skin of the hands of those metalworkers was poorer on germs no matter how other hygienic conditions were. It seems that there is a special antiseptic (germ-destroying) effect of the combination of metal filings and oil. If those workers had a hand injury, it usually healed wthout any complications.

Dr. L. Schwartz in Baltimore, a foremost expert of industrial diseases of the skin, mentions a few particular hazards to the skin and hands of workers handling steel and iron. Such hazards are: heat which causes not only burnings but also changes of the veins; lime; alumina; chromium; pickling acids; drawing compounds like soaps and greases; lubricant oils, etc. For welders in particular Schwartz mentions melanosis (black coloring of the skin) from ultraviolet rays of arc; zinc chloride.

Metal Must Be Protected From Rust

Because of long distance hauling, storage and varying climatic conditions, metal must be protected from rust and scratches. The rust preventive compounds, Dr. Schwartz points out, consist essentially of petroleum oil or grease and an inhibitor. Bright metal sheets such as duraluminum and Dow metal may be coated with a resin or oil.

Rust preventives and metal preservatives may well cause dermatitis — inflammation of the skin. The trouble on hands and forearms may occur not only among workers spraying rust preventives at the factory, but also among stevedores handling machines and motors in transit, and also among workers where the metal pieces are being unpacked and re-assembled. The skin trouble may be similar to that caused by cutting oils. Protective gloves, clothing, and ointments are helpful.

Cutting Oil Dermatitis

Despite the great deal of work already done, industrial dermatitis (inflammation of the skin) still presents a challenging problem in the metal industry. Occupational skin troubles constitute about two thirds of all occupational diseases reported by compensation boards. In a study of nearly 42,000 cases of industrial dermatitis, metals and metal plating belonged to the major offenders, besides petroleum products and greases, alkalis, solvents, plants, and woods.

How can you avoid such occupational skin troubles? The principal methods are: pre-employment examinations, proper ventilation in workrooms and plants, protective clothing where necessary, personal cleanliness, and protective ointments. It has been found that many workers dislike wearing protective clothes, but that they like protective creams and will use them consistently with preference.

Main function of an industrial skin protective preparation is to form a barrier film between the skin and the dirt, grime, or other compounds likely to cause a dermatitis. It is the same whether the protection comes from an ointment, a cream, or lotion.

Water-soluble cutting oils have the main function to cool the cutting tools so that they do not lose their temper and break or chip. Insoluble cutting oils are used mainly as lubricants. Skin lesions of hands and fingers occur in handling cutting oils unless the workers are particularly careful in washing their hands after work. Infected inflammations may develop into boils and carbuncles while wounds of the skin caused by metallic slivers (contained in the cutting oils) may become infected.

It is impossible for metalworkers and machinists to operate without cutting oils. Phenolic compounds, alcohol, etc., may be added to vegetable or animal oils to prevent them from becoming rancid and for sterilization. Sometimes the oils are sterilized by heat. Used oil may be reclaimed by sterilization and filtration, straining, or centrifugation.

Recent publications by Drs. G. E. Morris and C. C. Maloof in New England have shown that in spite of all preventive measures cutting oil dermatitis is still as prevalent today as it was a decade ago. All medical observers agree that the skin must be thoroughly cleansed of the oils in order to prevent dermatitis.

Fluorescent Oils Rubbed on Hands and Forearms

What is the best method to remove cutting oils from the hands?

To find an answer to this important problem, Morris and Maloof investigated the efficiency of no less than fifty-two cleansers in removing cutting oils from hands and forearms. Cutting oils containing fluorescent substances were rubbed on the skin of hands and forearms and then the cleanser was used: hand soaps, sand soaps, cornmeal cleansers, sulfonated oils, several common household detergents, etc.

Viewing of hands and arms under ultraviolet light showed fluorescence after the use of all the cleansers. This gave evidence that although hands and arms appeared to be clean there was still oil remaining on the skin. Not all of it has been washed off. The presence of cutting oil was also shown on supposedly clean wipe rags which had been supplied freshly laundered with cleansers which supposedly removed the oil.

Cutting oil dermatitis therefore in many cases can be attributed to oil that remains on the skin, and to oil from supposedly clean rags. Another factor is lack of protection of the worker. Old-fashioned machines that spread oil all over the worker should be replaced. Otherwise, protective sleeves and aprons should be used. The goal in industrial medicine is to find a reliable skin cleanser that removes all the oil from the skin.

Sterilization of oil was one of the means used by Drs. Carpenter and Clark to improve the absenteeism figures for metalworkers and machinists. They reported on the efforts of a large plant that had worked 18,000,000 manhours without a lost-time case of cutting oil dermatitis. The main efforts used in this plant, besides regular sterilization of oil, included the use of splash shields, built-up floor boards, wash fountains conveniently located for every worker connected with cutting oil, protective cream, cleaning and replacing of oil in machines at least every two weeks. Those workers who turned out to be particularly susceptible to oil rash or similar skin diseases were given jobs elsewhere.

If Russia gobbled up all Europe, the population of Russia plus that of Europe would be about 630 million. Ours is only 170 million. Russia then would have 50 per cent of the world's total manufacturing production, compared with our 40 per cent. NATO aims to prevent this. — *Wisconsin Military District Information Office.*

A shelf to store flower pots will last longer if given two coats of shellac. Allow the first coat to dry, which it will do quickly, before the second is applied. Wood flower boxes could use a shellac coat as sealer to conserve paint used as an outside coat.

— *Shellac Information Bureau.*

Today, steelmakers are able to produce 42 million tons more per year than at the end of World War II, an almost unbelievable capacity gain of 45 per cent in the comparatively brief postwar period. — *Steel Facts.*

Industrial Arts and Vocational Education

JOHN J. METZ, Editor

EQUIPMENT VALUES ON THE FARM

EARLY in 1958 a report from the Office of Education's specialist in farm mechanics announced that the value of equipment on American farms had reached a point where on many farms it was equal to the value of the farm land.

Greater progress in farm mechanization has been made during the past 25 years than in the previous 5000. Farmers now are using over four million tractors. These exceed the number of horses that farmers are now still using on the farm.

During World War I the farm worker had an average of 5 horsepower at his command — today he has about 50.

In colonial days 85 per cent of our people lived on farms. Today only 13.5 per cent of our population is engaged in farming, although the per capita consumption of farm products has risen enormously.

Electricity also has become a great helper to the farmer, and electrification has been extended to about 95 per cent of the U. S. farms. Instruction in farm mechanics is now given in more than 10,000 departments of vocational agriculture in our country.

Results seem to show that the shop teachers in our rural schools are keeping up with advances in their field as well as with advances in science and applied mathematics.

AMATEUR ROCKETRY

WILLIS C. BROWN, specialist for aviation education, division of state and local school systems, issued a warning earlier this year that students should not experiment with rockets and other missiles unless their work is closely supervised. It may be well to emphasize this warning again at the beginning of the present school year.

It is quite understandable that youngsters should be interested in this field of experimentation, but the dangers to which they are exposed are so great that the untrained should not be permitted to dabble with building rockets, mixing rocket fuel, loading rockets, or launching them without being supervised by an adult rocket expert. Warn your students especially that they should not attempt to work alone with rocket fuel in the home workshop or school laboratory.

The Office of Education suggests the following safety rules for educators and parents:

The school should:

"1. Encourage students to learn about the broad field of space exploration instead of rocketry alone. School science clubs can create interest in astronomy, physics, mathematics, and other subjects related to the conquest of space. Groups can visit scientific research centers and science fairs, show appropriate films, and schedule interesting talks on science.

"2. Emphasize the need for high school science teachers to keep up-to-date on scientific developments in this new field.

"3. Remember that teachers should not supervise experiments with rocket fuels or launchings unless they have had military or industrial experience in rocketry or unless a person who has such experience is also present.

"4. Become familiar with local laws concerning rocket launching and the use of dangerous fuels, chemicals, and combustibles.

"5. Rockets can be a hazard to planes in flight. Persons in charge of rocket launching should seek the advice of the nearest CAA Safety Inspector as well as local fire and police officials. Rockets which will not exceed 500 ft. altitude do not need CAA clearance. However, they must not be launched within 5 miles of an airport or in a CAA *airway*. Amateur rocketeers should be warned that they are fully responsible for any damage to persons or property resulting from their activity."

Parents have the responsibility to:

"1. Know where their child is working if he is interested in rocketry; what he is attempting; and that a qualified supervisor is present.

"2. Remember that even many common chemicals can be dangerous if misused."

THE VALUE OF AN ALTRUISTIC DEED

IN 1951 Nelson Wrangham, Jr., lay wounded on the field of battle. Other marines passed him, but a kindhearted lad stopped long enough to stoop and replace the helmet that had fallen off the wounded man's head. A short while after a sniper's bullet slammed into the steel hat, knocking the man unconscious without penetrating the metal.

The lad recovered and after his discharge he finished his high school course and took a VA 48-month rehabilitation course as an apprentice machine erector with a manufacturer of heavy industrial equipment. This course he finished in 39 months. His progress was so good that he was soon advanced to field mechanic.

He is now one of the top field men of his employer's company and has been sent on many overseas trips to supervise the building and assembly of power shovels, excavators, and overhead cranes.

Wrangham has every reason to be very thankful to the unknown marine who thoughtfully replaced the helmet that not only saved a life but made it possible for one of our disabled Korean Veterans to make a real success of his life.

The story also shows that one never knows what the results of a good deed may be. At any rate, the reading of this account may prompt someone to go and do likewise, probably not in the same way, but with the idea of helping someone who is not able to help himself. Such assistance given with no idea of reaping thanks or personal benefit has a way of giving the one who has performed the good deed a recompense which is much worth while in one way or other. At any rate, one may truthfully say that altruism is its own reward by the warm feeling we have all felt when we have performed a kindness to someone else.

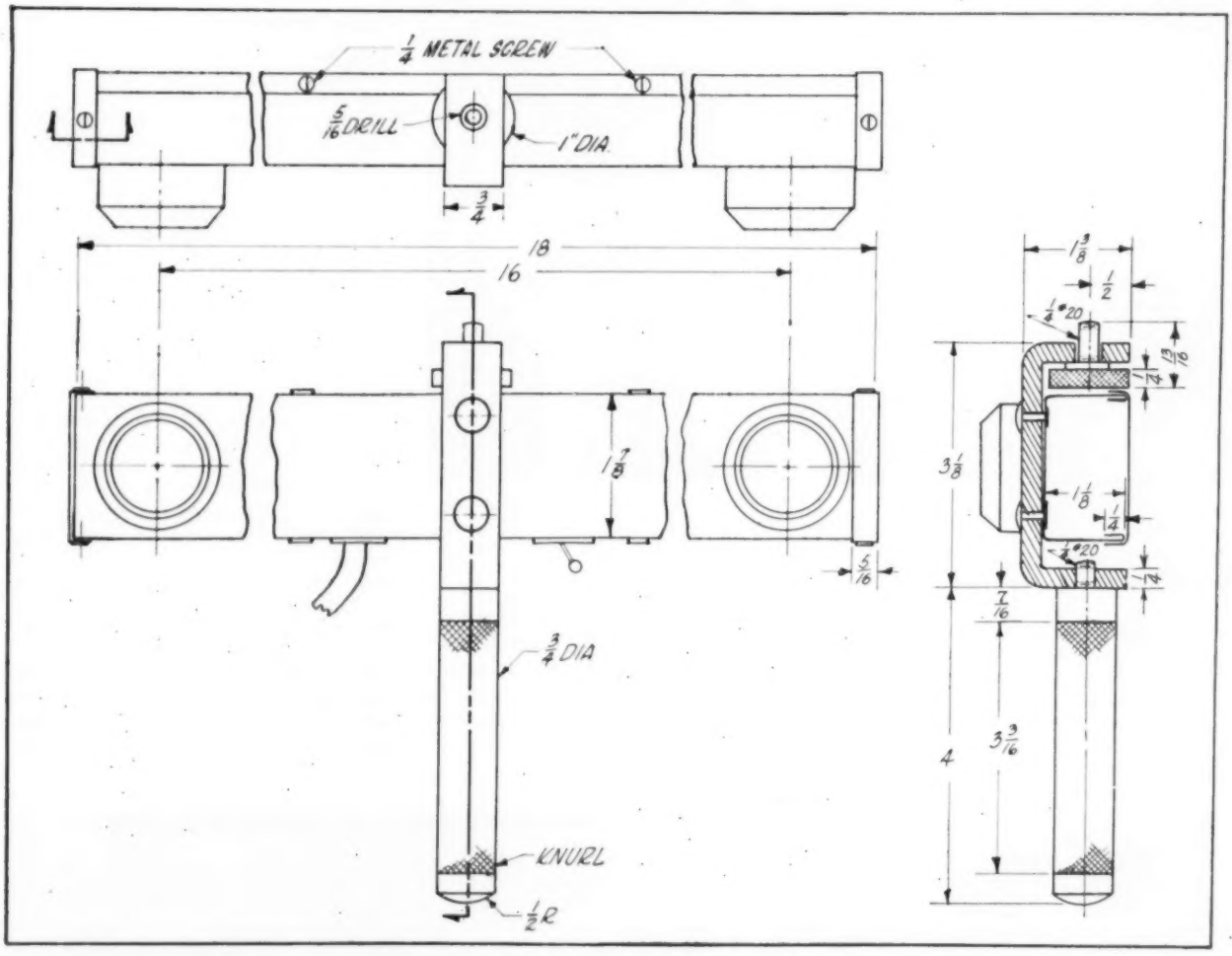
CLUBS FOR SHOP STUDENTS

NOW that the new school year has started, and you are over the turmoil of the first few days, what have you planned to make your particular offerings a little more appealing to your students? Are you aiming to have them strive for something extra?

Have you thought about starting a club or two for your shop students? Of course, not all of them will be interested in club work, but an appreciable number will, and more may be interested after you have started the work in your classes.

Some clubs, like craft clubs, home shop clubs, do-it-yourself clubs, maintenance clubs, and nature-study clubs contain things that interest boys, and one or the other on the list may help you to interest some of your students in acquiring attitudes that will prevent them from being delinquents.

Problems and Projects



Construction details for making the light bar

LIGHT BAR

ATHOL R. BAILY
University of Washington
Seattle, Wash.

For the student interested in photography, or who has a friend or a relative interested in this area of activity, the light bar makes a challenging and interesting project. It involves operations in metalwork and electricity, such as laying out patterns, cutting sheet metal, forming hems, folding corners, drilling sheet metal, forming bar stock, drilling holes in metal, tapping threads, fastening metal with self-tapping screws, and wiring an electric circuit.

To meet the varying needs and abilities of the students, as well as shop facilities, the handle may be made several different ways. If an engine lathe is available and the instructor desires to provide experiences on that machine, it may be turned, knurled, and threaded as shown in the photograph. For the shop not equipped with a lathe and for the junior high school student, the handle may be made by cutting a rod of the desired diameter to the proper length, then drilling and tapping one end to receive a ⅜ in. — 20 stove bolt. To give it a pleasing texture, the handle may then be peened. Another method of making the handle, if foundry equipment is available, is to make a pistol grip two piece pattern and cast it.

When making the light bar a switch may be installed in the cord or may be installed in the body of the light bar. The picture has the switch on the cord, while the sketch shows the switch in the bar. Several kinds of switches may be used, but it should be UL approved for at least 6 amperes. In designing the project it is well to first select the type of light holders and switch to be used, and then vary the dimensions to accommodate them.

Since the knurled bolt is held in place by the body of the light bar it is necessary when assembling to be sure it is in place before the body is riveted to the heavy bracket.

The light bar shown in the picture has been made of pebble grain aluminum.

— Photograph by Whitie Marten

The light bar in use

However, other materials may be used just as well. On material requiring a finish, a professional type of finish may be achieved by using one of the various finishes that wrinkles when it dries.

For the more advanced student, a light bar that holds four lights makes a challenging project.

Oil painting on inexpensive glassware is an interesting hobby. To keep the dry paint from rubbing off, a thinned coat of fresh, white shellac should be applied over the surface. — *Shellac Information Bureau.*

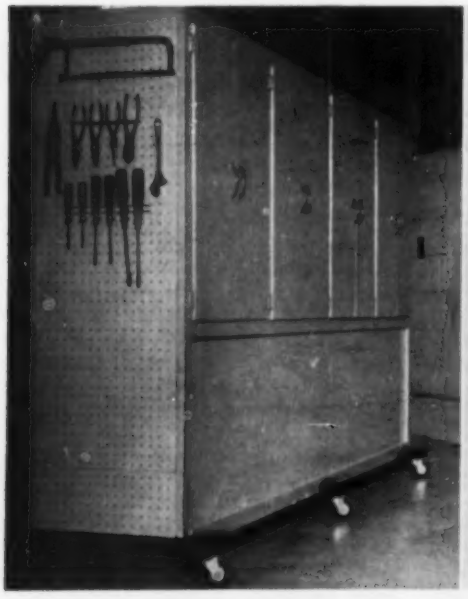
MOBILE TOOL AND STORAGE PANEL

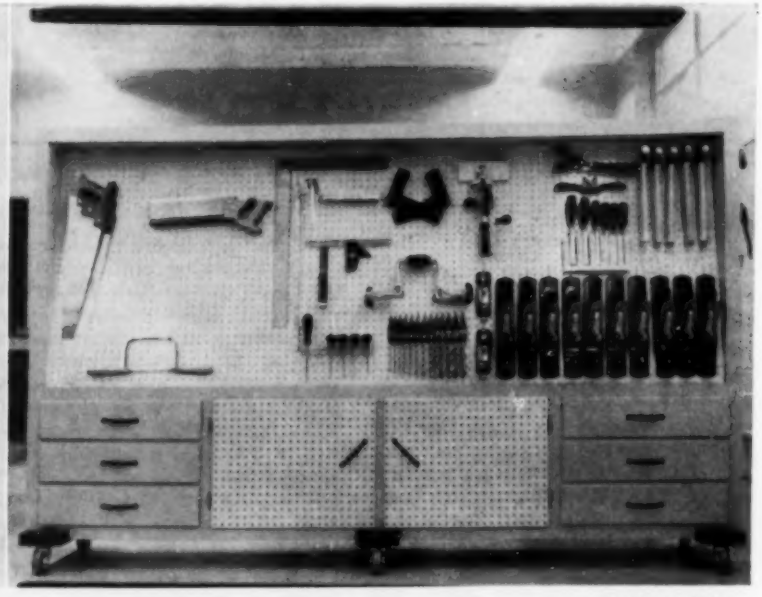
WILLIAM F. BAUERS
Instructor of Industrial Arts
Hortonville Union High School
Hortonville, Wis.

When a new industrial-arts department is set up on a rather limited budget one of the factors which merits consideration is flexibility so that new areas may be added in the future with a minimum of relocating existing equipment.

To accomplish this aim the mobile tool and storage panel was designed and constructed. It requires a minimum of space and holds all of the hand tools and supplies necessary for an average sized class. Three inch rubber, ball bearing castors allow the panel to be moved easily about the shop so that it may be positioned for easy access to the woodworking area or moved out of the way to make room for other activities.

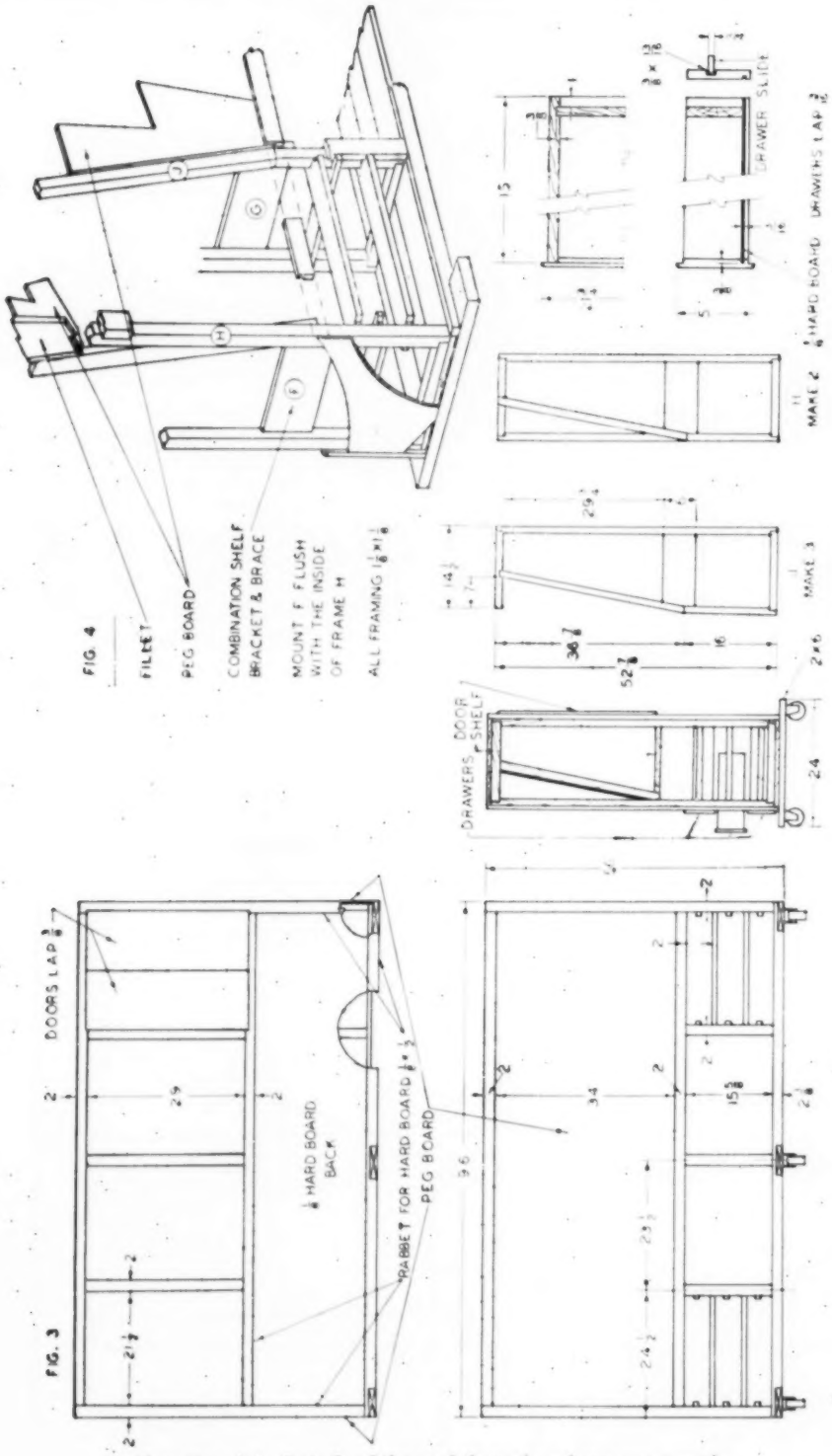
This tool panel has been in use for one year and the peg board has proved very practical. It has the unique advantage of making rearrangement of the tools a very simple mattter when new ones are added. Some of the commercially available tool holders will prove practical for the lighter tools while custom-made ones will be required for the heavier or odd shaped ones. The custom-made holders may be fastened to the peg board with either screws or bolts and if the existing holes in the peg board are used it will not be defaced.





— Anzalone Photo

Fig. 2 (at left). The storage panel. Fig. 1 (at right). The mobile tool and storage panel



Figs. 3 and 4. Details of the mobile tool and storage panels

The peg board proved itself a real time-saver recently when additional tools for 12 students were added. It has been found practical to keep the backsaws in a special holder in the base of the cabinet. One of the drawers has a custom-made tray which holds all of the wood and metal files. Another is divided into compartments to hold the various grades of abrasive paper, while a third is used for screws.

The eight doors at the back of the cabinet give access to the back side of the peg board and a large shelf. If these doors are made "off limits" to the students they will provide a storage area for additional supplies and special tools.

The mobile tool and storage panel allows the instructor to control and minimize traffic and it makes the shop arrangement more flexible.

Directions for constructing the mobile tool panel in Figures 1 and 2 are as follows:

1. Select stock: Shiplap for the floor and shelf, ¾ plywood for the doors and drawer fronts. ¾ pine for the facers, drawer slides, drawer sides, drawer dividers, shelf supports, and fillets. ⅛ tempered hardboard for the drawer bottoms and back of the panel. ⅛ peg board for the tool panel and ends.
2. Construct the floor of the cabinet using the three 2 by 6 legs for cross members.
3. Construct the 5 frames. (Refer to Figure 3.)
4. Fasten the frames to the floor with screws. (Hold them in position with temporary braces nailed on the inside.)
5. Nail the top on the frames.
6. Install the peg board. (Use ⅝ by RHB screws.)
7. Install the masonite on the lower back. (Use finish nails where they will be covered by the facers.)
8. Remove temporary braces.
9. Install all of the facers.
10. Install the drawer dividers.
11. Install the drawer slides.
12. Construct and fit the drawers.
13. Construct and fit the doors. (Use regular cabinet hardware with friction catches to hold them closed.)
14. Install the shelf.
15. Saw out and install the two fillets.
16. Finish to your shop color scheme.

An interesting pastime is painting on wooden plates. To prepare, first give the wood a thin, fresh coat of pure, white shellac. Another shellac coat over the dry painting will preserve the beauty of the project. — *Shellac Information Bureau.*

Drive as if your life depended on it — it does! — *National Safety Council.*

Safety is an investment only fools can't afford. — *National Safety Council.*

The Pentagon has three times the office space of the Empire State Building, twice the area of Chicago's Merchandise Mart, and three times the base area of the Great Pyramid. — *Wisconsin Military District Information Office.*

CONTEMPORARY END TABLE

J. R. CHADWICK
Instructor
Industrial Arts Department
Senior High School
Fort Dodge, Iowa

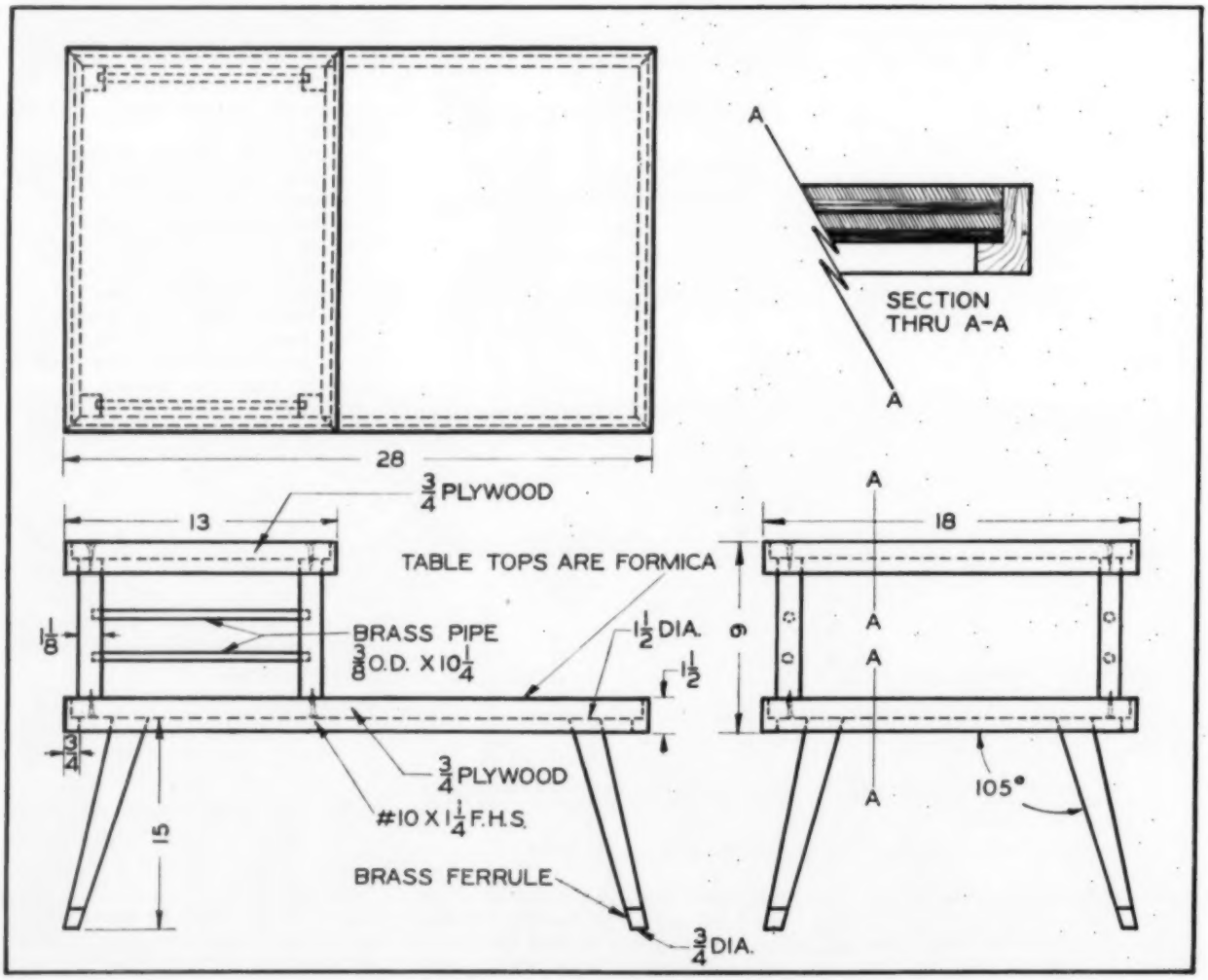
Construction of this contemporary end table is not as difficult as it may seem. This table has been built in our ninth to twelfth grade shops. The style is in keeping with present-day design. A number of variations can be made in its construction to suit individual desires. Any natural hard wood can be used in place of the formica tops; however, natural maple or white formica tops offer a pleasing contrast against such woods as walnut, and in addition, makes a top that cannot be easily marred. The frames around the top and shelf can be constructed of plywood and covered with formica if so desired.

BILL OF MATERIALS

No. of Pieces	*Name of Part*	*Material*	*Size*
1	Top	Fir ply	¾ x 17½ x 27½ in.
2	Top side rails	Walnut	¾ x 1½ x 28 in.
2	Top end rails	Walnut	¾ x 1½ x 18 in.
1	White or natural maple	Formica	18 x 28 in.
1	Upper shelf	Fir ply	¾ x 17½ x 12½ in.
2	Shelf side rails	Walnut	¾ x 1½ x 13 in.
2	Shelf end rails	Walnut	¾ x 1½ x 18 in.
1	White or natural maple	Formica	13 x 18 in.
4	Posts	Walnut	1¾ x 1⅛ x 6¾ in.
4		Brass tube	⅜ x 10¼ in. long
4	Legs	Walnut	1½ x 15 in. tapered to ¾ in.
4		Brass ferrules	
4	Leg mounting brackets		

Construction Procedure

1. Construct two frames with mitered corners to fit around plywood for top and shelf. Cut rabbet joint on frames and fit plywood flush with frame.
2. Cement formica to top of table.
3. Drill ⅜-in. holes ½ in. deep in posts and insert ⅜-in. brass tube.
4. Fasten posts to table top with No. 10 by 2-in. f.h. screws.
5. Fasten upper shelf to posts with No. 10 by 2-in. f.h. screws.
6. Cement formica to upper shelf. Formica may be trimmed with a portable



Details of construction — contemporary end table

Contemporary end table

router equipped with a veneer trimming attachment or it may be planed or filed and then sanded flush.

7. Legs are turned on lathe to 1-in. diameter at top and tapered to ¾ in. on bottom end.

8. Attach legs with regular leg mounting brackets.

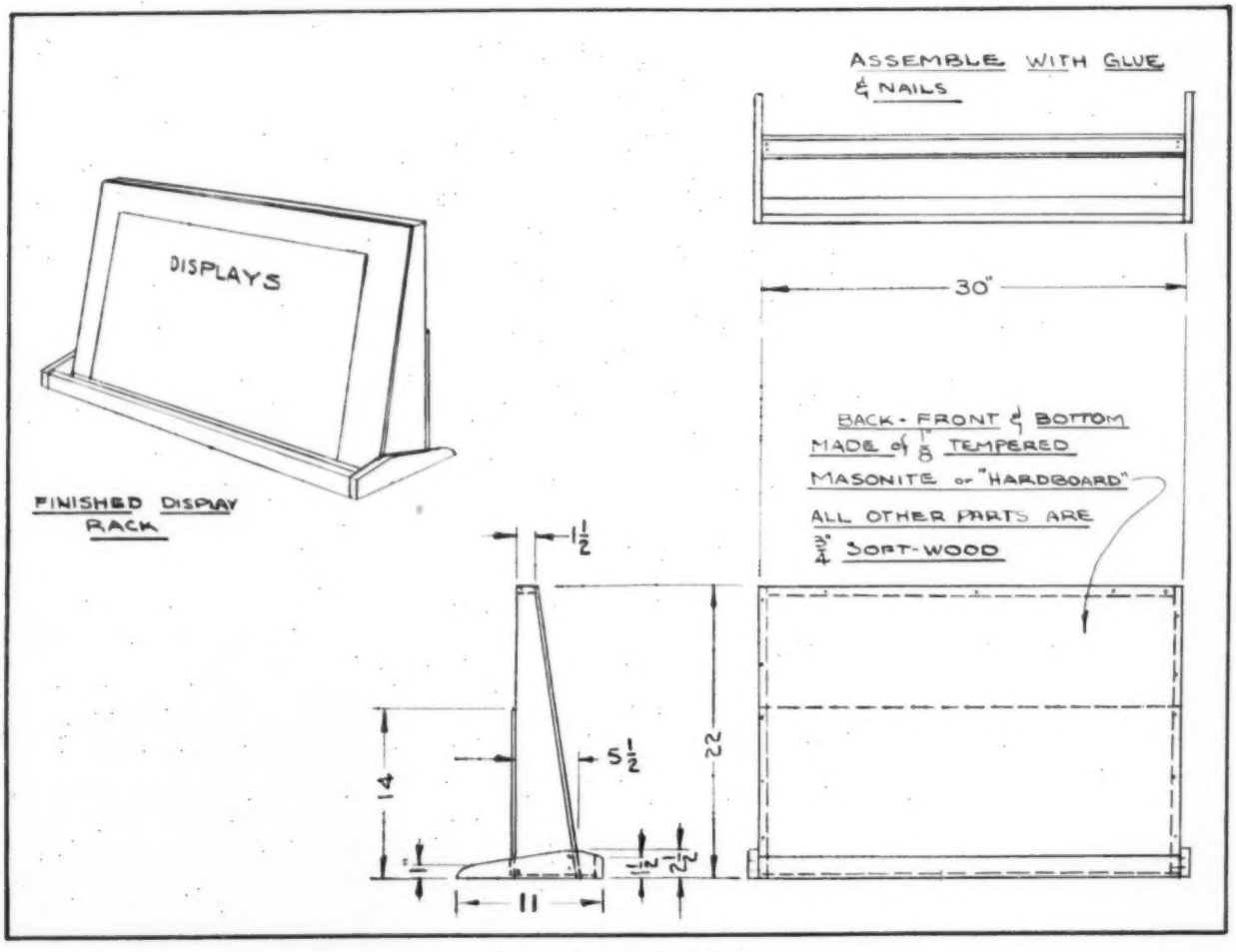
9. Finish all wood parts with your favorite type of materials.

10. Install brass ferrules on end of legs.

DISPLAY RACK AND CHART HOLDER

GEO. A. WILLOUGHBY
and
NORMAN RISK
Eastern Michigan College
Ypsilanti, Mich.

Charts are very valuable teaching aids when some convenient arrangement is provided for displaying them in any order desired, and for storing them as they are removed from the display area.



Display rack and chart holder

The display rack and holder illustrated in this article serves these purposes in a very satisfactory manner. The basic ideas are that the charts are stored in a boxlike container behind the display rack and that they may be lifted up and placed on the rack as desired. They may be lifted out and displayed in a given sequence or in any order desired if the charts bear identification marks.

The whole rack with cards in place can be carried readily by the top piece.

This device may be designed for any desired sized charts, the one shown having been designed for 22 by 28-in. posters.

CANNON WHEELS MADE IN THE MACHINE SHOP

WAYNE E. COLLINS

Machine Shop Instructor

High School

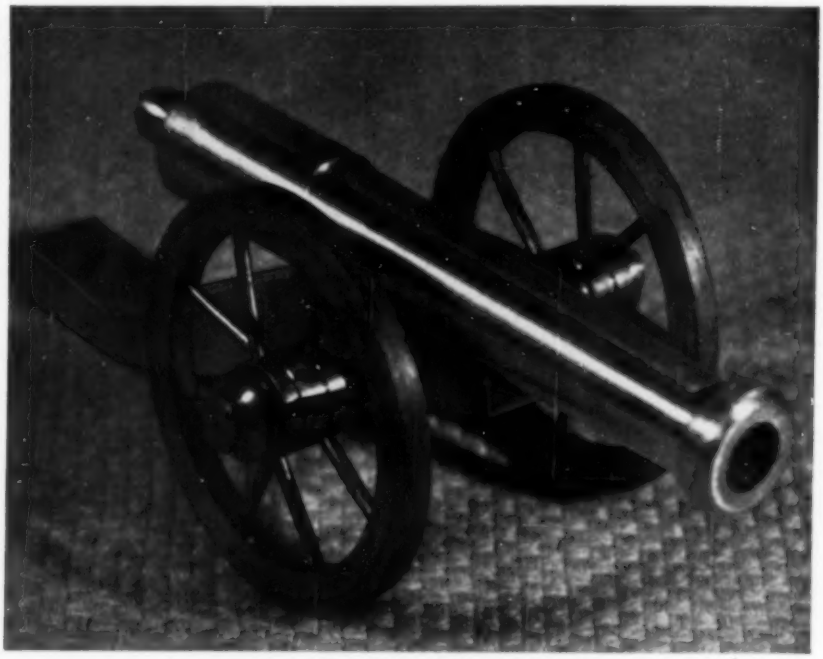
Hobart, Ind.

Ever since the wheel was invented, man has steadily improved it and with it has steadily advanced his civilization. Of all the different types of wheels, I like best to remember the ones used on the covered wagons that carried Americans westward in the early days of our country's growth. I believe that the wheel pictured here will not only offer a challenge to the student's ability, but will give a great deal of satisfaction at the completion of the project. Students in our shop have used the wheels not only on covered wagons but also on cannons and Roman chariots.

The wheels can be made any size you desire, being limited only by the size of material you have on hand. Different kinds of metal can be used to make any part. If no inside mike is available, you can get a good fit on the rim and tire by the following method:

Extend the depth of the O.D., and I.D., on the tire about ¼ in. After cutting off your tires, you have a small flange protruding from the rest of the stock. Now to turn the O.D. of the rim to get a good fit, you should feed the cutting tool into the metal until it just removes the flange. Run this cut along the metal until you can try one of your tires for a fit. Be sure to try your tire to see if it is the right fit before completing the final cut.

Credit and thanks for this wheel should go to Jay Baron of the Ho Hi photography class and to Evan Young of the Ho Hi drafting department.



Cannon equipped with wheels

Procedure for Completing the Wheels

Tires

a) Secure material which will finish out 2½ in. in diameter, about 3½ in. in length. This will allow enough for chucking.

b) Turn material on lathe to 2½-in. O.D. to a length of about 1¼ in. In case of error, there will still be enough for an extra wheel.

c) Drill and bore to 2¼-in. I.D. to a depth of about 1¼ in.

d) Using a cutoff tool, cut three tires 3/16 in. wide and finish all four surfaces.

Rims

a) Use the rest of the material after cutting the tires.

b) Turn O.D. to 2¼ in. for a length of 1¼ in. (check blueprint).

c) Drill and bore to about 1.938-in. I.D. to a depth of 1¼ in.

d) Using a cutoff tool, cut three rims 3/16 in. wide and finish all surfaces.

e) Place a rim on universal chuck attached to indexing head. Chuck the inside of rim.

f) After setting indexing head on drill-press table, shim the head on one end, so that the chuck is tipped to approximately an 8-deg. angle. (1) We used a ¾-in. piece of wood as a shim to get our angle. (2) If your drill-press table can be tipped at an angle, you will not need to shim the work.

g) Clamp indexing head to drill-press table and check to see if you have correct angle and the rim is centered under a 3/32-in. drill.

h) Making sure that your 3/32-in. drill will not penetrate the sides of the rims, proceed to drill four equally divided holes around the rim. It would be less work on your part if you would drill your other rims and hubs at this time, using this same four-hole setup.

j) After drilling the first four holes, turn the rim around and rechuck.

k) After determining the middle distance between any two holes, start drilling your second set of four holes following the same procedure as in (*h*). This will give eight equally spaced holes on the rim. Each hole will be running at an 8-deg. angle. Every other hole will be running in the same direction at an 8-deg. angle.

Finish and polish rims.

Hub

a) Secure enough material to make two hubs which will finish out ⅝-in. O.D., and 7/16 in. long. Be sure to add enough for chucking.

b) Turn material to ⅝-in. O.D. Drill through center with ⅛-in. drill and ream.

c) It would be wise to mark with cutting tool the circle on which the spoke holes are to be located.

d) It would also be wise to leave both hubs together until the holes have been drilled for the spokes.

e) Using the same setup as for drilling holes in the rim, proceed as directed at (*k*) when drilling the hub. Drill the spoke holes in hubs to a depth of about ⅛ in.

f) Turn hub material around and drill other four holes using the same procedure as directed at (*j*) and (*k*) in the directions given for making the rims.

g) Cut the two hubs from the material and polish.

h) A hubcap of your own design can be used on the wheel.

j) Using 3/32-in., brass rod, cut eight pieces 1 in. in length to form the spokes for each wheel.

Assembling

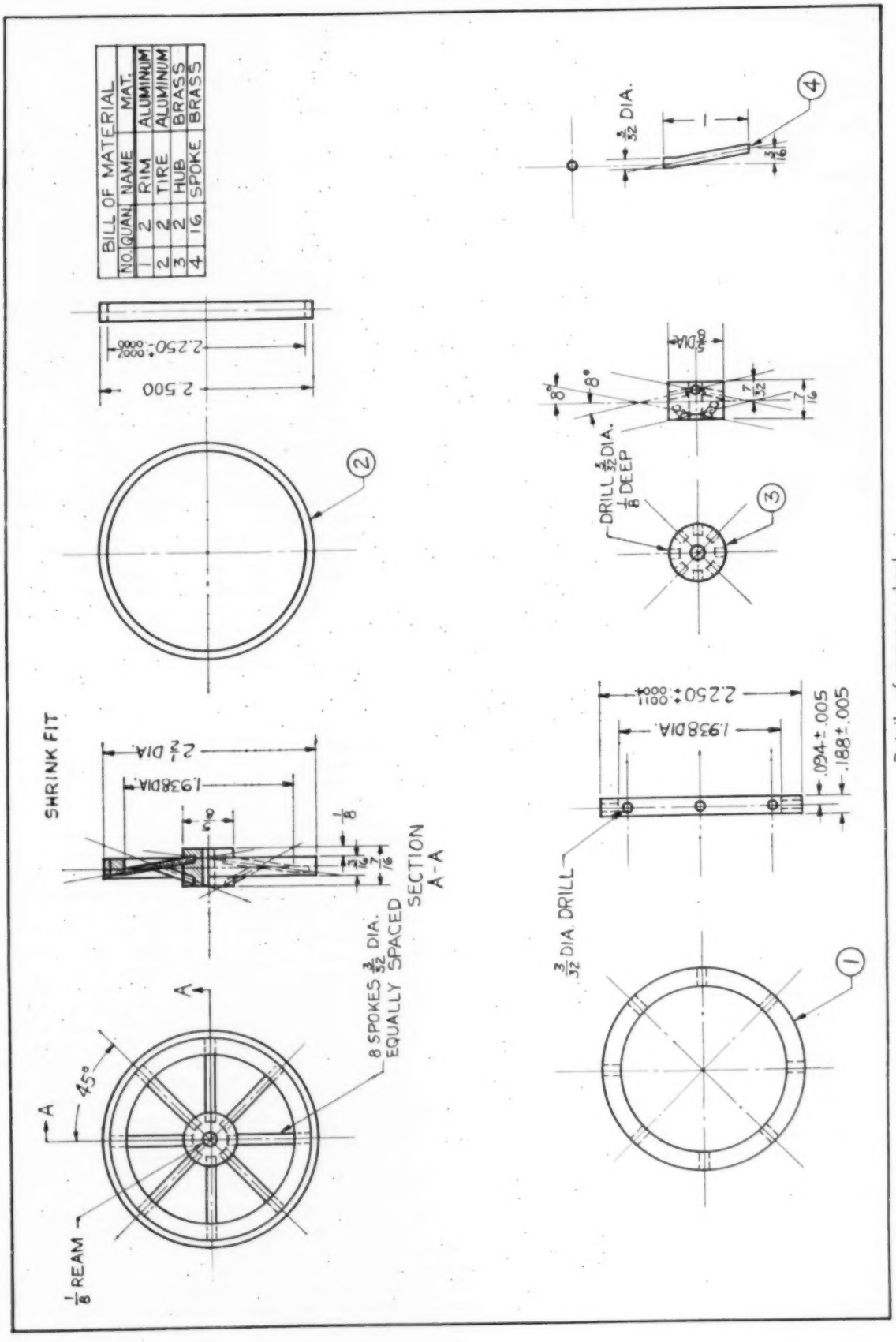
a) If several wheels are to be made, it would be wise to fix a jig to hold the hub and rim.

b) Place one 3/32-in. spoke through the rim hole from the outside and force into spoke hole of hub.

c) Place the next spoke opposite from your last assembled spoke, through the rim, and into the hub.

d) Repeat the directions for the other eight spokes.

e) Check to see if wheel runs true.



Details of cannon wheel

f) File off excess length of spokes sticking through the rim. If a spoke is short, make sure it cannot work out of the hub and be lost.

g) Press tire on assembled hub and rim.

h) Polish sides smooth.

TOOL IDENTIFICATION BOARD

EUGENE LEVY

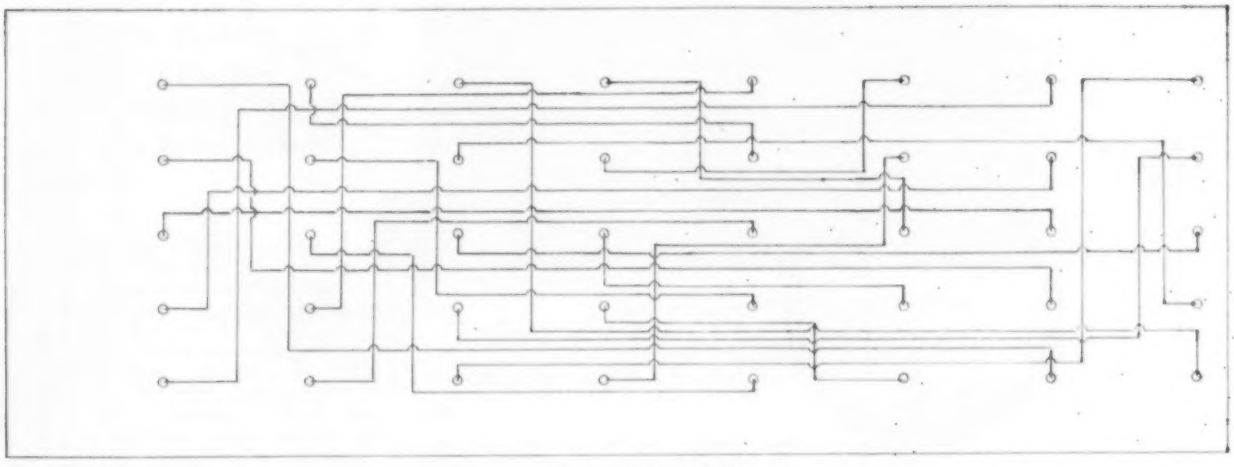
E. B. Shallow Junior High School

Brooklyn, N. Y.

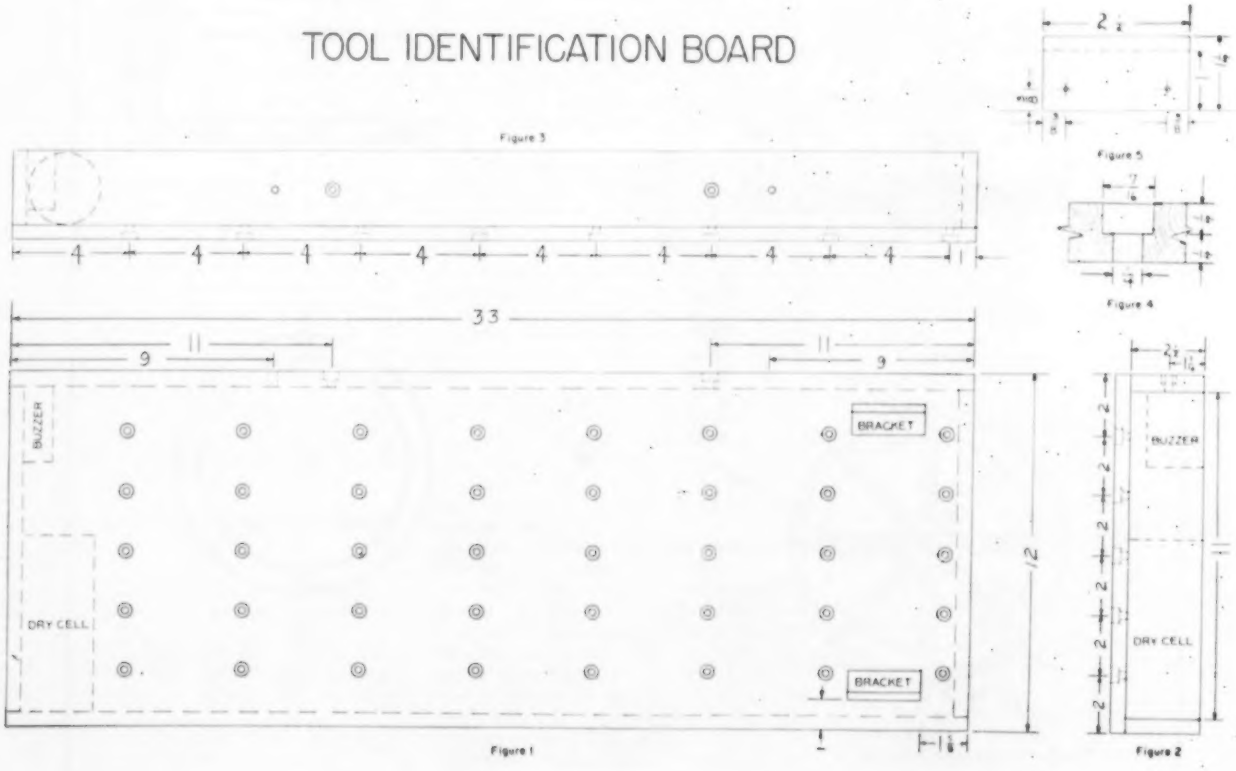
How do you interest a teen-ager in things as unromantic as tools? There are, of course, several ways, ranging from the simple explanation of what the tools are and what they do, to the gimmick type of interest raiser.

One of the best methods found to date is one in which learning is "sugar coated" through association with a game. Learning doesn't seem so much like work to a youngster if camouflaged in the form of a game.

The tool identification board can be variously utilized by the junior high school, or high school shop teacher. As a starter, the teacher can use it as a project for the entire class, having the boards made by each individual as a question and answer game. As an instruction aid for the teacher, the board serves as an excellent visual means of giving a general introduction to all the tools used in a particular shop. This introduction is made especially vivid since each tool is identified by a picture and the correct nomenclature. In areas where teachers have students speaking a foreign language, the board helps surmount the language barrier by supplying the picture of the tool as well as the correctly spelled English name and the foreign name.



WIRING DIAGRAM



An identification board of this type can be made available for each specialized shop — ceramic, metalworking, woodworking, etc., by simply changing the pictures used on the board, and substituting other pictures. The photos used on the board are easily obtained from any tool catalog, and can be changed as tool models change. A tool identification board is described, along with the bill of materials, and building procedure, below.

BILL OF MATERIALS

1 pc. mahogany ½ by 12 by 33 in. (front)
2 pcs. mahogany ½ by 2½ by 11 in.
2 pcs. mahogany ½ by 2½ by 33 in.
2 phone jack tips (Birnbach)
42 phone jacks (Birnbach)
16 pcs. 18 ga. copper, 1¼ by 2½ in.
1 2½ in. vibrating buzzer
1 No. 6 dry cell
6 ft. of lamp cord
1 pc. 18 ga. copper, 1 by 6 in.
40 ft. double cotton covered No. 18 annunciator wire
26 ¾ by No. 7 round head brass screws
32 ½ by No. 3 round head brass wood screws
8 2½ by 10 in. oaktag strips

Method of Procedure

1. Lay out the mahogany stock for the two sides, the top, and the bottom. Mahogany was chosen because of its ease of working and the beautiful finish which it takes. However, any other durable wood will do if mahogany is not available. The stock is laid out oversize so that sufficient material is allowed for squaring. The stock for the top and bottom should be ½ by 2¾ by 34 in., and the two pieces for the sides are ½ by 2¾ by 12 in.

2. Square off only one edge of all four pieces.

3. From the squared edge of each of the pieces, measure across 2½ in., and square off the remaining edges to the 2½ in. width.

4. Measure ½ in. from one end and square a line across the stock. From this squared line, measure the exact length, as noted in Figure 1, and square a line across the second end.

5. Using a miter box, cut off the ends of all the stock. This procedure for squaring the stock is recommended by the author. There are several other methods used for stock squaring, but this has been found to be the quickest and easiest by the author for his students. Individual instructors can alter this procedure depending upon the skill and experience of the students with tools.

6. Lay out the front to measure ½ by 12¼ by 34 in. which is slightly larger than finished size.

7. Square the front to the final size, ½ by 12 by 33 in., using the same procedure described in the previous steps.

8. From Figures 2 and 3 lay out the position of the 40 holes, which will receive the phone jacks, on the front panel, and the 2 holes on the top panel.

9. Using a No. 7 auger bit equipped with a bit stop, bore all 42 holes described above. The bit stop should be set at ¼ in.

10. After all 42 holes have been bored to the desired ¼ in. depth, change to a No. 4 auger bit and continue to bore the holes all the way through. (See the detailed Figure 4 on the phone jacks.)

11. First rough sand, and then smooth sand the front of the front panel of the plug board.

12. Mount the phone jacks into the holes provided.

13. Assemble the sides, top and bottom, using glue and eight ¾-in. No. 7 round head wood screws. Two screws are used for each corner.

14. Mount the front on the frame, and attach using the remaining 18 ¾-in. No. 7 round head brass wood screws. These are placed four along each end and five along each edge.

15. Make all the connections noted in the wiring diagram, using No. 18 annunciator wire. Solder all connections. All answers to a single column of questions will be contained in a corresponding single row. This makes for ease in making and replacing the cards. Using this system, it is unnecessary to maintain a master list of answers. However, if it is found that the students have memorized the position of the answers in relation to the questions, it is a simple matter to change both the questions and the answers.

16. Mount the 2½-in. vibrating buzzer inside the cabinet in the position indicated in Figures 1 and 2.

17. The No. 6 dry cell is next mounted in position using a 1 by 6 in. piece of 18 ga. copper. This bracket will hold the dry cell securely in place inside the cabinet.

18. Divide the lamp cord into two pieces, each of which will be 3 ft. long. A phone jack tip should then be soldered to each piece of lamp cord.

19. On the top of the cabinet, 1 in. from the phone jack, drill a ½-in. hole.

20. Sand the entire cabinet to the desired smoothness.

21. Finish the cabinet with 3 coats of clear varnish.

22. Insert the phone jack tips into the phone jacks on top of the cabinet.

23. Insert the other end of the wire through the ½-in. hole mentioned in step 19, above.

24. The plug board is now ready to be wired prior to testing and use. Connect one lead from one jack tip to the buzzer, one lead from other jack tip to the No. 6 dry cell, and, with a third lead wire, connect the dry cell to the buzzer. The third lead uses the remaining No. 18 annunciator wire.

25. Test the buzzer by putting the two phone jack tips together. If the circuit is working properly, the buzzer will buzz.

26. Test the entire cabinet circuit by plugging the jack tips into individual jacks and checking the continuity. If the circuit is complete, the buzzer will sound when the question is matched with the proper answer.

27. Lay out the brackets designed to hold the question and answer cards. These are made from strips of 18 ga. copper, 1¼ by 2½ in.

28. Round all the corners of the brackets to avoid the possibility of it catching on clothing or, perhaps, scratching the skin of the operator.

29. Lay out the position of the holes, centerpunch, and drill a $^{3}/_{32}$-in. hole.

30. File the burred edge smooth from the back of the hole.

31. Bend a ¼-in. fold in the copper strips, then polish and lacquer the copper.

32. Mount the brackets, using a ½-in. No. 3 round head brass wood screw as shown in Figure 1.

When the cabinet and wiring have been completed, oaktag strips should be cut to size and inserted in the copper brackets. Glue the tool pictures in position on the oaktag strips. There is nothing left for the instructor, or student to do, except enjoy their handiwork, and reap the benefits of a better way of teaching.

RADIO REPAIR INSTRUCTION ON A LOW-COST BUDGET

LOUIS G. GALAMBOS
Head Radio Instructor
Irving E. Macomber Vocational High School
Toledo, Ohio

The need for developing or refining better teaching methods and obtaining necessary shop equipment to cope with an ever expanding student body has always been a problem to industrial-arts instructors. This situation is further complicated — and will become more so — by our rapid scientific advances, particularly in the field of electronics.

One of my own teaching problems centered around instructing classes (averaging 35 students a semester) on radio trouble shooting and radio repair. With a limited equipment budget, there was the problem of doing a thorough teaching job in an allotted period, while at the same time

Fig. 1. The author is shown explaining the operation of the Radio Instructional Panel to two of his students. Using the Panel and auxiliary equipment cuts down instructing time 50 per cent at a 150 per cent saving compared with the former teaching method

Comparison of Teaching Methods

No matter what method we use to teach a full course in radio repair and fundamental electronic circuitry, we will require basic auxiliary equipment consisting of a volt-ohm meter, a signal generator and a signal tracer. Before using the panel, I found it necessary for each individual student to construct and assemble some kind of a simple circuit, such as a one-tube radio, power supplies, amplifier, and so on. While this work is extremely important to the beginning student, I found this to be a deterrent in learning advanced radio trouble shooting. My students were repeating basic manipulative skills where the emphasis should be on the learning phase of proper diagnosis and serving procedure. In addition, these elementary circuits were far from dependable and you can probably imagine the difficulty any instructor would have using them as a medium to instruct students. By the end of the year they were practically useless, so they were disassembled and the few parts that could be salvaged were placed in the stockroom.

Besides the terrific amount of personal supervision required in the former method, a constant supply of parts had to be kept on hand and it was necessary to administer all the routine to co-ordinate the students' individual projects.

holding the students' sustained interest in radio and electronic theory as well.

However, I finally evolved a better teaching method that saves 50 per cent of my time and permits me to devote twice as much attention to students in a school year for 150 per cent less budget appropriation than formerly.

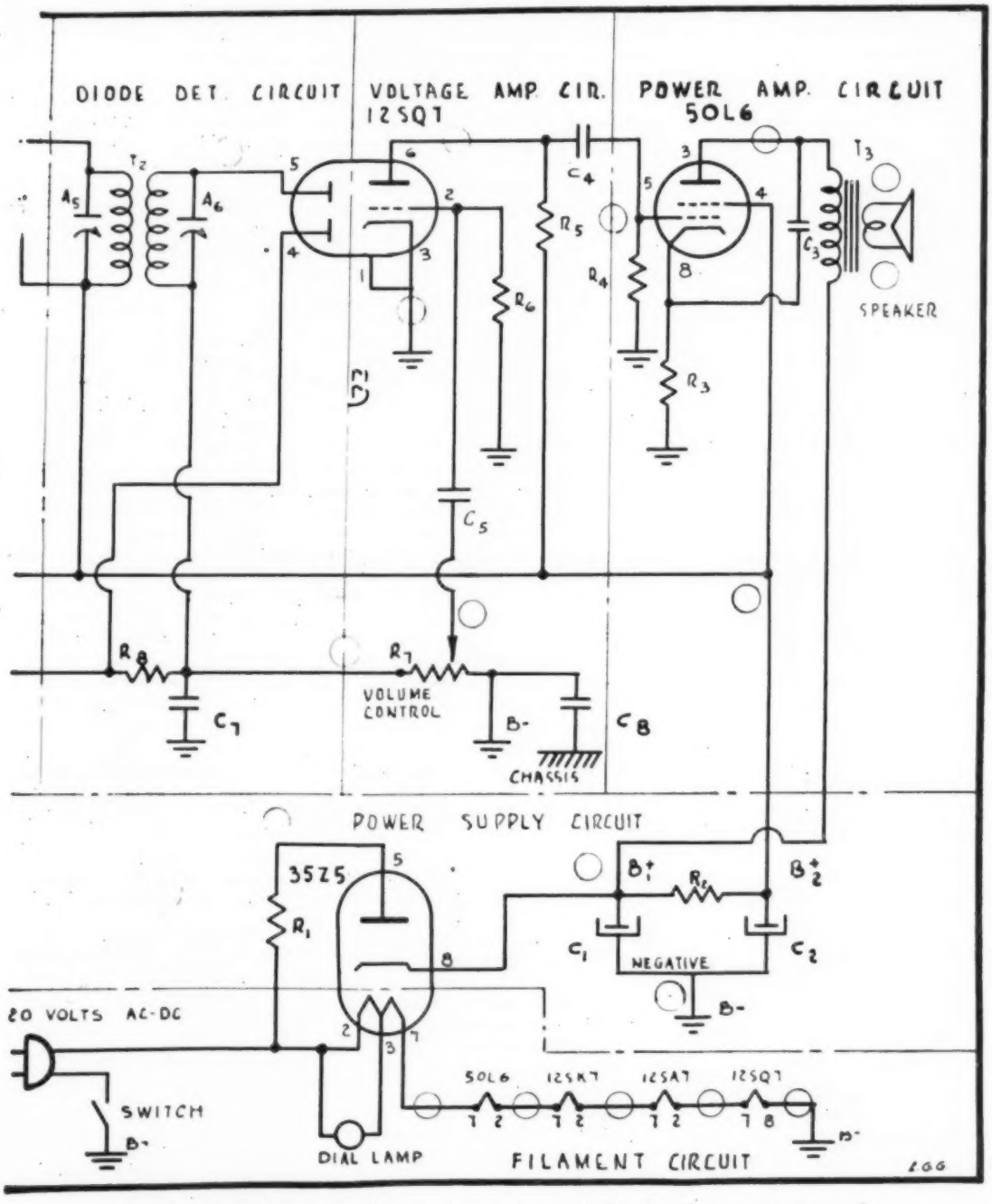
The Radio Instructional Panel

The course is based on using an instrument called the Radio Instructional Panel, together with an assignment book containing a complete course in radio trouble shooting, radio repair, and fundamental electronics. This book, incidentally, not only covers assignments but clearly explains the technical aspects of radio and circuitry in detail.

The panel is actually a working radio containing another panel on which all radio circuits are shown by color coding. These circuits shall be described later. In addition, the panel has switches and other devices to simulate actual radio defects. Merely by the flick of a switch, it is possible to simulate as many as 25 different combinations of circuitry trouble and by referring students to the assignment book they can immediately diagnose the defects and the methods for servicing or repair.

The panel is lightweight, portable, and plugs in to any 110 V a.c. or d.c. wall socket. The panel is manufactured by H. H. Buggie, Inc., Box 817, Toledo 1, Ohio.

Fig. 2. The Radio Instructional Panel was designed as a teaching aid both for instructors' and students' benefit. It weighs 12 lb., and the natural finish plywood case with brass fittings measures 12 by 16 by 7in. It is portable and plugs in to any 110-volt a.c., or d.c., wall socket



Line drawing: A portion of the instrument's panel showing the arrangement of the circuits which are color-coded for easy identification. As many as 25 different defects and solutions can be simulated using these circuits and the book of instructions and assignments.

However, the panel eliminates this and, besides saving a great deal of time, I can now concentrate on the courses rather than needless stockroom supervision, requisitioning, and so on.

Because the panel is an intriguing instrument to the students, and because the book of assignments is clear and concise, the more intelligent students progress more rapidly, freeing the instructor's time to concentrate on those who are having difficulty understanding radio trouble shooting, repair or circuitry. Also, the assignment book aids in the answering of many students' questions since reference can be made directly to the contents of the book.

I have found that I can instruct up to three students per panel and I try to group students having equal ability and equal training. When lecturing on either a specific problem or general theory, the transition from lecture to actual assignment is rapid, since there is no time lag in following up the lecture with a tedious circuitry setup.

What about using this teaching method where only a small segment of a class is to be taught radio repair, or where budgets are limited? Use of the panel presents an ideal solution. Moreover, the instructor who is an all-round industrial-arts man but not an electronic or radio specialist will find the assignment book will bridge his knowledge gap very nicely.

By the same token, high school or college instructors can take advantage of the instrument's simplicity to conduct a course in radio circuitry, radio repair, or fundamental electronics. Teaching an assignment unit requires from two to three hours, therefore the courses can be adapted to a laboratory period, class time period, or an adult night school period.

Engineers-in-training who are acquiring a sound technical background in electronic theory frequently lack the training to apply this theory on a practical basis. Because of their electrical and electronic pre-training, however, they could use the panel in conjunction with the assignment book to learn how to diagnose and service circuits.[1]

Probably every industrial-arts instructor whose students are working with live circuits dreads the possibility of accidents. With this teaching method, however, such fears are lessened since the panel is constructed with high voltage lines well insulated and no metallic parts exposed. In fact, with normal precautions, this method should be accident free.

Comparison of Costs

During nine years of teaching radio repair at Irving E. Macomber Vocational High School, a record has been kept of costs that should prove interesting to anyone working with a limited budget (and who isn't?). With normal use, one Radio Instructional Panel should last at least three years, therefore these figures are based on a three-year period for purposes of cost comparisons.

Records show that when a student must assemble his own elementary circuit in order to take the course, it costs $10 per student per semester for electrical supplies. Under this system, it required a year to teach a full course in radio repair. Based on a current average class of 35 students, it formerly cost about $700 per year for basic supplies and for a three-year period this amounted to $2,100. Besides original supplies, replacement supplies, due to breakage or usage, amounted to $5 per student per semester, or $1,050 for a three-year period. These sums total $3,150 for the three-year period.

The equivalent cost of 12 radio instructional panels (one per three students) amounts to only $894. Replacement costs are about the same as a home radio, but I have allowed $10 per unit per year, amounting to $360 for the period. Also, it is suggested that each student have an assignment book. The manufacturer supplies extra copies at 50 cents, so this amounts to an additional $99 for the period. These three figures total $1,353 as compared to $3,150 for the former method. This represents a saving of $1,797, or, in my case, permits requisitioning the difference for other shop equipment that could not otherwise be obtained.

Method of Teaching

Using the radio instructional panel, the assignment book and the auxiliary equipment (volt ohmmeter, signal generator, and signal tracer), teaching a full course in radio trouble shooting, radio repair, and fundamental electronic circuitry is now relatively simple.

The instructor first explains to students how the panel and auxiliary equipment operate and explains the color coding used on the panel's panel denoting functional areas where breakdowns occur. The filament section is green; the power supply, red; the audio frequency section, blue; the I-F section, pink; the oscillator section, yellow; and the mixer section, orange.

After introducing the students to the methods of using all equipment coincident to the course, the first assignment on troubles that occur in the filament section of a normal radio is given. The students are immediately referred to Unit I of the course where they learn what the circuit is and its relation to other circuits together with technical information and explanations.

Now using the panel, the students next simulate a defect and how to actually service it. This procedure is followed throughout the 10 units of assignments. Since the students may have had prior electrical or radio workshop training, no physical servicing is performed. Emphasis is placed on proper diagnosis and servicing procedure rather than basic manipulative skills.

Three hours have been allotted for each unit of assignment and during that time it is possible to instruct the entire class (who are now working with a panel in pairs or threes) and to answer questions that different groups may have relative to the assignment. Prior to using this method, it was very difficult to instruct individual students working with their own circuits in this limited time.

From the 10 basic units of assignments, there can be taught as many as 25 different trouble shooting assignments through combinations the panel provides. The following defects can be simulated: shorted filament circuits; open first filter condenser; open filter resistor; open second filter condenser; power amplifier cathode-to-heater short; leaky coupling condenser; open I-F transformer; open oscillator coil; defective oscillator grid circuit; and open loop antenna.

For advanced students, they can be given an imaginary "trouble" to transfer to the panel and then prepare their own diagnosis and method of servicing without referring to the answers or instructions in the book. Students can thus learn the same methods and procedures that professional radio servicemen know and use.

An assignment unit can be covered fairly thoroughly in two hours and comprehensively in three, and since there are 10 basic assignments, the basic course requires 30 hours.

Summary

Besides the numerous teaching benefits this method affords, I find that I can instruct a class 50 per cent faster and a full course can now be covered in one semester instead of two. This method also provides the student with a greater penetration into the mysteries of circuitry without the former confusion and loss of time that confronted my teaching efforts. I believe that other instructors could also plan and time each course with this method, the same as I have been doing. Safety factors, of course, are of primary importance to anyone who is teaching electronic circuitry and by using the panel this worry is minimized.

Last but not least, the money saved over a period of time should appeal to both instructors and school management alike.

COMPARATIVE COSTS

Based on Class of 35 Students

Former Method	
Materials Cost:	
per student @ $10 per semester* per year, for 3 years	$2,100
Replacement Costs:	
per student @ $5 per semester* per year, for 3 years	1,050
Total	$3,150
Radio Instructional Panel	
Materials Cost:	
Cost of 12 radio instructional panels (one per 3 students), average life 3 years	$ 894
Assignment booklets, @ 50¢ per student per year	99
Replacement Costs:	
$10 per unit, per year	360
Total	$1,353

The above costs represent a 150 per cent savings by using the panels over a three-year period. The new teaching method requires 50 per cent less of the instructor's time.

[1]The author is a registered professional engineer in electrical engineering.

*With the former method, it required two semesters to teach a full radio repair course to an average class of 35 students. However, only one semester is required to teach the same course using the panel.

NEW GUINEA MASK

BEN HUNT

Hales Corners, Wis.

Although this mask calls for a piece of wood 2½ in. thick, it is quite easy to make. Two 1¼-in. pieces glued together will do the trick and since it will be painted, the glue mark will not show in the finished mask. After sawing out the blank it can be roughly shaped with a small hand ax or, by screwing a block onto the bottom, as shown in Figure 1, the blank may be held in a vise and roughed out with a draw knife. The general shape, before whittling out the details is much like a large cabochon stone. Clamping it in a vise may be easier for some folks to carve, especially if they prefer using chisels. This one was done with a pocketknife. After the eyes, nose, etc., are whittled, the mask should be well sanded.

Then it was finished in black with one coat of cut shellac and two coats of flat black enamel. After letting it get bone dry, it was rubbed briskly with a piece of Turkish toweling, which gave it a very pleasing semigloss finish.

These Sepic River masks are usually painted in colors, and every one is painted differently even though they are for the most part painted with red, yellow, and blue paint. What I am going to say now may sound rather far-fetched. If I wanted my Sepic River mask painted in color, I would ask my six-year-old granddaughter to do it. She is just passing from the colored crayon to the water color stage, and the effect of that kind of painting would look very much like the original masks. Those natives probably used a chewed end of a twig for a brush and ground minerals and water for the paints.

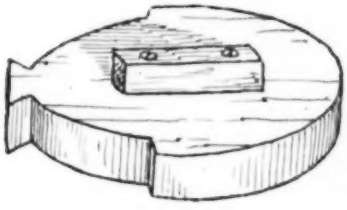


Fig. 1. The blank ready to be clamped in the vise.

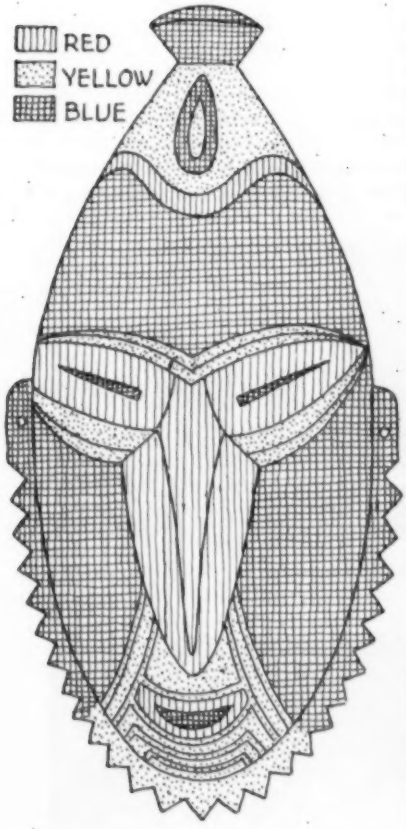
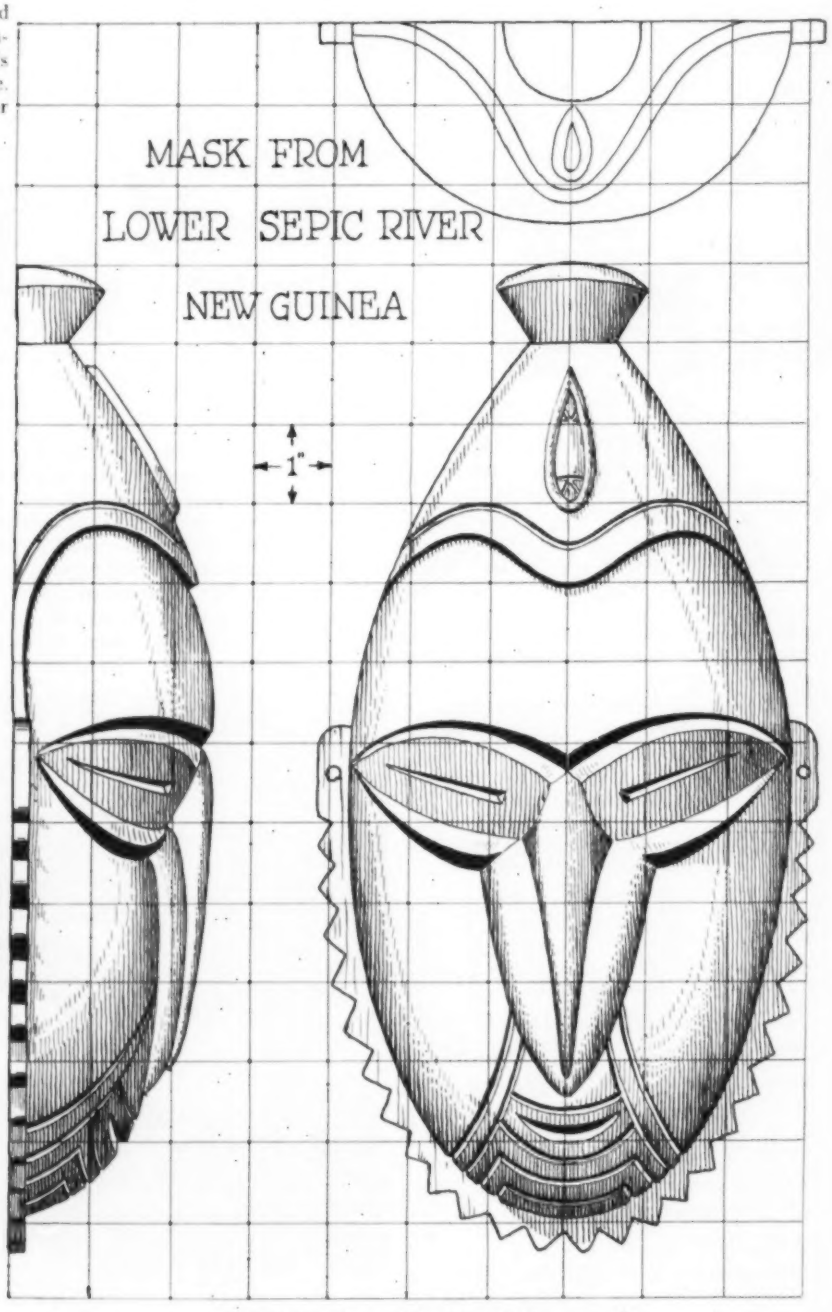


Fig. 2. What colors to use, and where



Detail drawing of the New Guinea mask

The mask sanded and painted

A nice smooth paint job such as we are accustomed to doing would spoil these masks and give them a commercial look. The charm of most of the native craftwork is in the consistent unevenness of the workmanship, whether it is the carving or the painting.

A word about the color. Cheap poster colors work out best. A sort of Prussian Blue is used, not too "pure," and the red has a brownish cast produced by adding a bit of brown or black. The yellow looks as though it were dirty, or as though it were painted with a brush that wasn't cleaned well. Figure 2 shows a distribution of color that is quite pleasing.

So, if you wish to try to produce a primitive looking paint job on this mask, give it to a beginner or do the job left-handed, if you are right-handed, and don't apply the colors too evenly.

THE PLACE OF BOATBUILDING IN THE INDUSTRIAL-ARTS PROGRAM OF JUNIOR AND SENIOR HIGH SCHOOLS

CLAUDE W. HORST
Industrial Education
University of Washington
Seattle, Wash.

The question is often asked, "Does boatbuilding have a place in high school?" That question should be answered first in terms of its contribution toward the fulfillment of the generally accepted industrial-arts objectives. These were worked out by the policy and planning committee of the American Vocational Association, and published under the title "Improving Instruction in Industrial Arts" in 1946, and then, more recently, under the revised "Guide to Improving Instruction in Industrial Arts" in 1953. A brief glance at the list convinces one that boatbuilding in no way is contrary to any of these objectives, and fulfills some of them better than the more usual projects.

A boat project can help *to develop an interest in industry*, and it definitely serves *to develop the appreciation of good design and workmanship;* it provides an excellent opportunity *to develop habits of self-reliance and resourcefulness*, and more than many projects, the successful completion calls for co-operation and an organized plan of procedure. If it is a group project, it offers an opportunity for boys to plan and work together for a common interest. It cannot be accomplished without "an understanding of drawings," and a considerable "measure of skill and knowledge in the use of common tools and equipment."

But pupils do not often come to the industrial-arts shop to "learn tool skills," nor "an understanding of drawings," nor "an appreciation of good design and workmanship," much less the "habit of an orderly, complete, and efficient performance of any task." They come to *make* something, preferably something they themselves can use. A long list of projects was presented to the boys in a number of Milwaukee, Wis., vocational school classes to get an idea of what they would select if given a free choice. The list contained the usual small pieces of household furniture, a list of mantlepiece models (tractor, airplanes, and

My new boat. This one I had built in Germany. It is 30 ft. long and 9-ft. beam. I am using the same plans and will put in a 200-h.p. motor

boats), operating models of these, and model power plants that could be used to run all sorts of other projects; and three full size small boats: an eight foot skiff, an eight foot sailboat, and a six foot outboard waterscooter. The projects in which 90 per cent of the boys were interested, were the operating models and the full size boats. A few were interested in the mantlepiece models, but the projects usually considered *core* were practically ignored.

From many teachers' experience, as well as from such experiments, it seems that boys are very much interested in making projects through which they and their friends have a chance for action, participation, and perhaps competition. Can the industrial-arts teacher make use of this strong boy interest as a motivation for the accomplishment of the objectives set forth above? Is the urge to acquire for himself the project of his own choice strong enough to carry the boy through the process of digging out the information necessary before he can really get started, and then see him through to the completion of his project? It is a matter of record that the enthusiasm of boys building something for which they have a strong desire remains high, and that they will not only put in countless hours of work, but will make the effort to meet academic requirements as well.

In areas where boating is a recreational activity the pupils will reflect this in their desire for a boat model, or for a small full size boat, and in many such communities these are the most satisfactory of the strong interest projects for the school shop. The satisfaction achieved through an expression of craftsmanship which has produced a quality boat is not easy to surpass. It is a performing project which can be shared with friends, and for which high esteem is given. A boy can have the prestige that goes with a job well done, and at the same time is given a feeling of confidence for more difficult tasks in the future. Boats certainly contribute to good wholesome outdoor recreation, and promote father-son relationships through sharing a common project.

There is much value in the building of a working model boat, and its operation afterward can teach the pupil a great deal about full size boats. Reading and following a drawing becomes important; accuracy and tool skill show up in a way that is evident to a boy's eye; stability and seaworthiness show up in its performance, and he learns good taste in design through his study of many drawings. The shop teaching procedures in handling model building are simple, and offer all the variety of tool skills the instructor wishes to include in the course; and the project can be completed within a comparatively short time.

But how about full size boatbuilding? Is it really possible within the physical limits of the usual shop? Obviously, even a small boat takes up a certain amount of room — more, probably, than the usual industrial arts project. Boats of six to eight feet provide as much motivation as the large ones, and work out as a two boy project. When space is at a premium, the boat can be assembled on a building horse, and at the close of the period, the whole structure simply removed and set up on end against the wall.

Generally speaking, the equipment found in most school woodworking shops is adequate for boatbuilding. Any industrial-arts program set up on a two period shop basis, meeting not less than three days a week, can handle a boat project by carefully selecting pupils with good shop records. Two period classes that meet five days a week are preferable, of course, and offer the possibility of slightly wider choice of pupil builder and of boat design.

Should the boat be used as an individual project, a simple construction should be chosen that will not take too long. An eight foot plywood skiff is a possibility, and boats of this size are being adopted for the junior high school program. Where two or more boys wish to build and own a boat together, a larger and safer size should be chosen. The boat should be large enough for all the boys working on it to ride safely in it at the same time. Through the construction of a project of this kind, the boys learn to cooperate, plan, and work together.

In addition to plywood boats, plastic boats are being made by amateurs through the use of forms rented from material suppliers. These are designed by competent naval architects and can therefore be relied upon to produce good safe performers. Using ready-made forms, beautiful plastic boats can be made in a very short time. The decks and seats may be made of wood and this calls for considerable skill and accuracy on the part of the pupils, but a well-shaped plastic boat will provide a strong incentive on the part of most boys to do their best so their part of the job will be on a par with the plastic hull.

Can any good industrial-arts instructor teach boatbuilding? Yes, he can. A boat is different from other school shop projects in that it is to be operated in a somewhat dangerous element, and for this reason, the instructor must always be concerned to build only safe boats. Should he be unfamiliar with boatbuilding, he will of course need to do some studying on his own before he introduces it to his class. The information is easy to acquire, and his sources of information are numerous. The Coast Guard, commercial fishermen of the area and the owners of pleasure craft are all glad to share their knowledge and enthusiasm, and there is quite a literature on the subject. Plans can be obtained very easily through national boating magazines, the many books on the subject, or through a local naval architect who probably would enjoy co-operating.

After the teacher has acquired this information and chosen a simple design geared to the abilities of the pupils, and having the stability and good taste he considers necessary, it is a good idea to run through the construction for himself. Any good woodcraftsman will have no difficulty in building a high quality small plywood boat which would be adequate for any junior or senior high school shop program; after he becomes more sure of himself through experience he will discover he can introduce more advanced types of design and be sure of the quality of his class' product.

In the last analysis, the place of boatbuilding in the industrial-arts program should be considered to be that of a very important "big," "high interest," or final project, because it not only meets the industrial-arts objectives, but goes beyond them by providing strong pupil motivation. It is something that will belong to the boy himself, something he can operate, that he can share with others, and will lend him prestige. For these reasons he is willing to get ready for it — to meet certain requirements and do the necessary preliminary tasks.

GOLF TROPHY

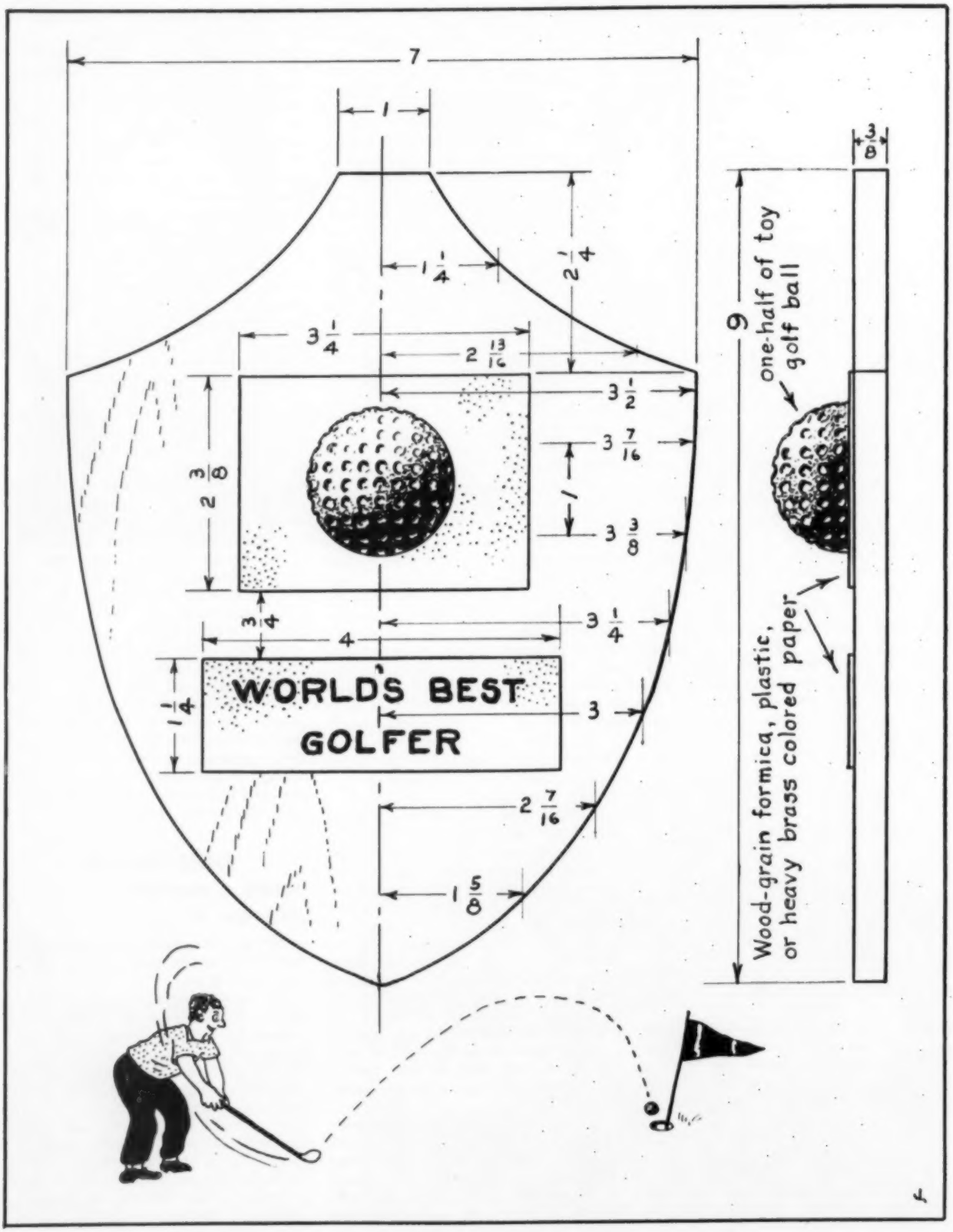
JOSEPH J. LUKOWITZ

Milwaukee, Wis.

This interesting project has much appeal because of the widespread interest in the great game of golf.

The detailed drawing specifies the thickness as $\frac{3}{8}$ in. Actually any thickness from $\frac{3}{8}$ to $\frac{3}{4}$ in. is suitable if solid wood is used. If plywood is used anything from $\frac{3}{16}$ to $\frac{1}{4}$ in. may be used. Beauty of grain is not especially desirable, in fact, large ornate grain pattern detracts from the effect. A very fine finish is a must on a project of this type. Tempered masonite either $\frac{1}{8}$, $\frac{3}{16}$, or $\frac{1}{4}$ in. thick is excellent material for this project and the lack of grain gives a richness of color which is very desirable. Also do not overlook the possibility of obtaining plywood cutoffs faced with wood grained plastic.

The background for the golf ball and the

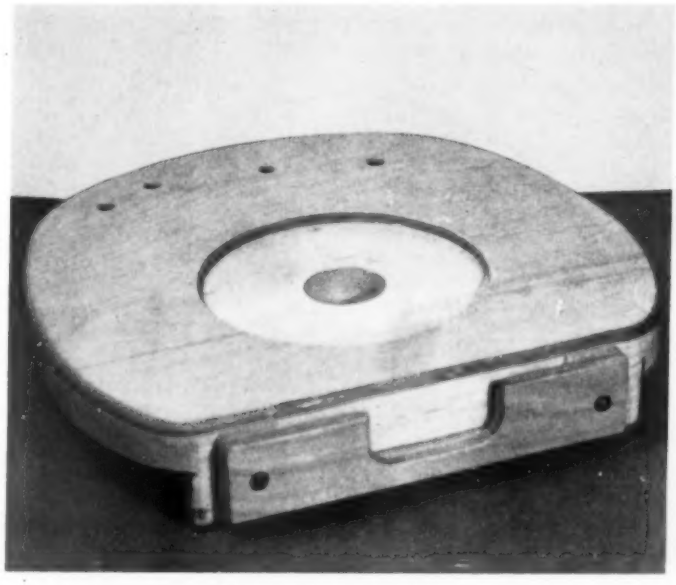


Details of golf trophy

lettering plate will simulate brass if you use a heavy brass colored paper. Scraps of formica in some light wood grained pattern could also be used for these plates. There is also available wood grained plastic sheet about 18 in. wide, in rolls, with adhesive attached which is excellent for the purpose. The lettering can be done with India ink. Rub a little talcum powder vigorously over the surface to be inked, otherwise the ink may not take.

Toy golf balls made of soft rubber which resemble the real thing perfectly, can be obtained in toy stores for about 7 cents. One golf ball makes two trophies since only one half of a ball is used for a trophy. The golf ball can be cut with a sharp knife. Do not attempt to cut a regular golf ball. It will not retain its shape when cut. Some golf balls contain a liquid which may squirt into your eyes.

It is hoped that besides the benefits the boys receive from constructing this project that their elders will be consoled by receiving such a trophy at the end of the season even if their golf record seems too dubious to qualify for an award.



Base of router carrier

ROUTER CARRIER

ERNIE A. HICKSON
Head, Industrial-Arts Department
Capuchino High School
San Bruno, Calif.

The router case shown is designed to contain the router and basic accessories.

Using this device, it is easy to quickly issue the router with necessary cutters and with a glance check to see that everything is returned. It has the additional virtue of easy construction. The wrench holder is laminated from two pieces of ¼ in. plywood and the large recess for the router, is cut out of ¼ in. plywood which is then laminated to a 1¾ in. thick piece of stock. The overall shape and dimensions can vary with the type of router, etc.

FERRIS-WHEEL LAZY SUSAN

LAUTON EDWARDS*
Park Junior High School
Knoxville, Tenn.

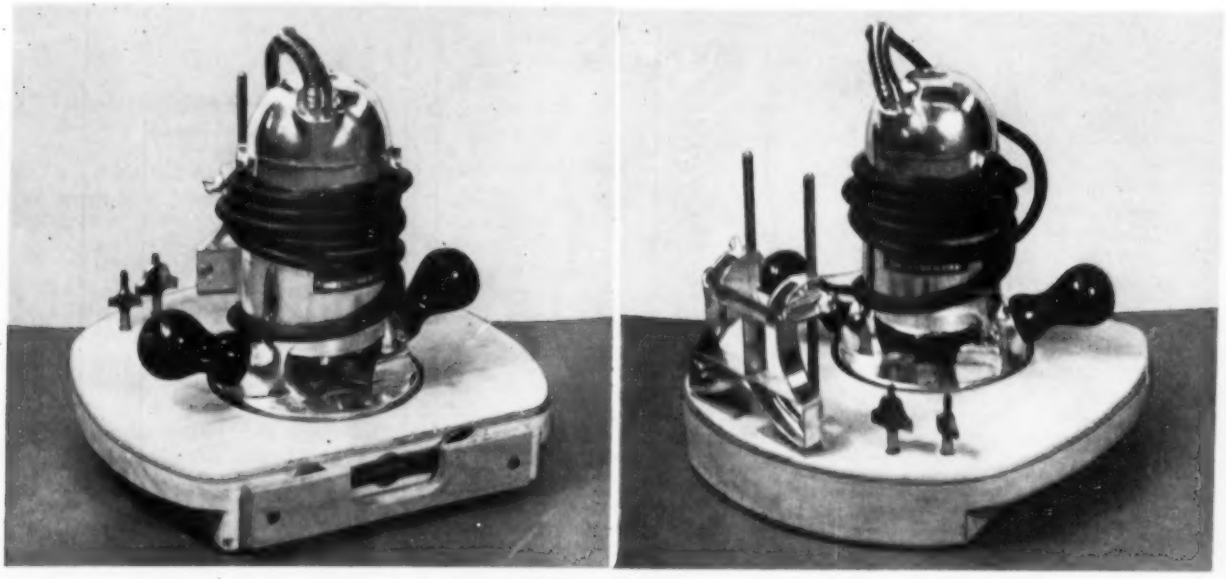
This project was winner of the second prize in the 1957 Industrial Arts Awards contest. The winner was Arnold Schwartzbart, ninth grade student at Park Junior High School, Knoxville, Tenn.

Drawing by Clarence G. Thompson, Fulton Drafting Class.

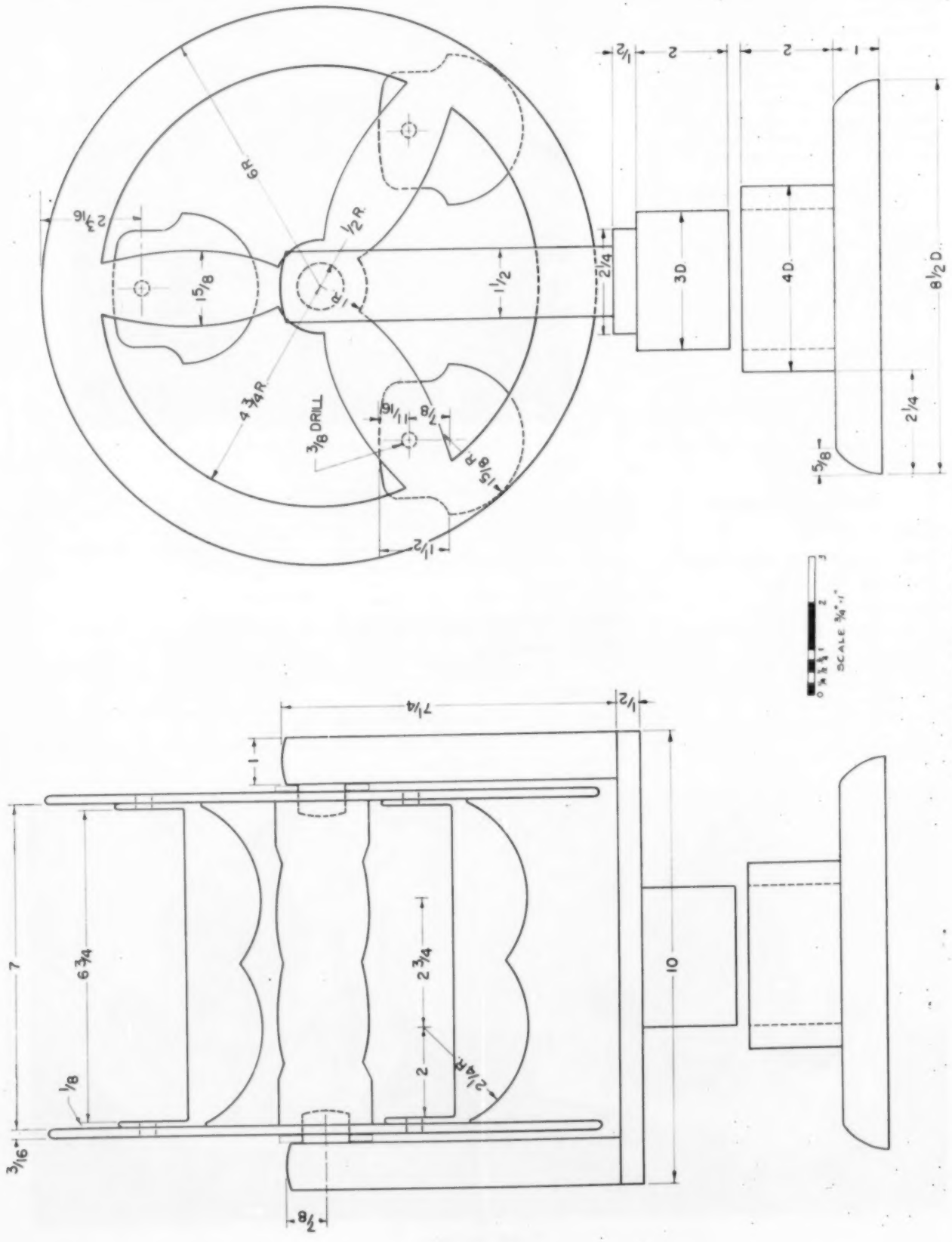
*Author of *Making Things of Plastic*.

Base

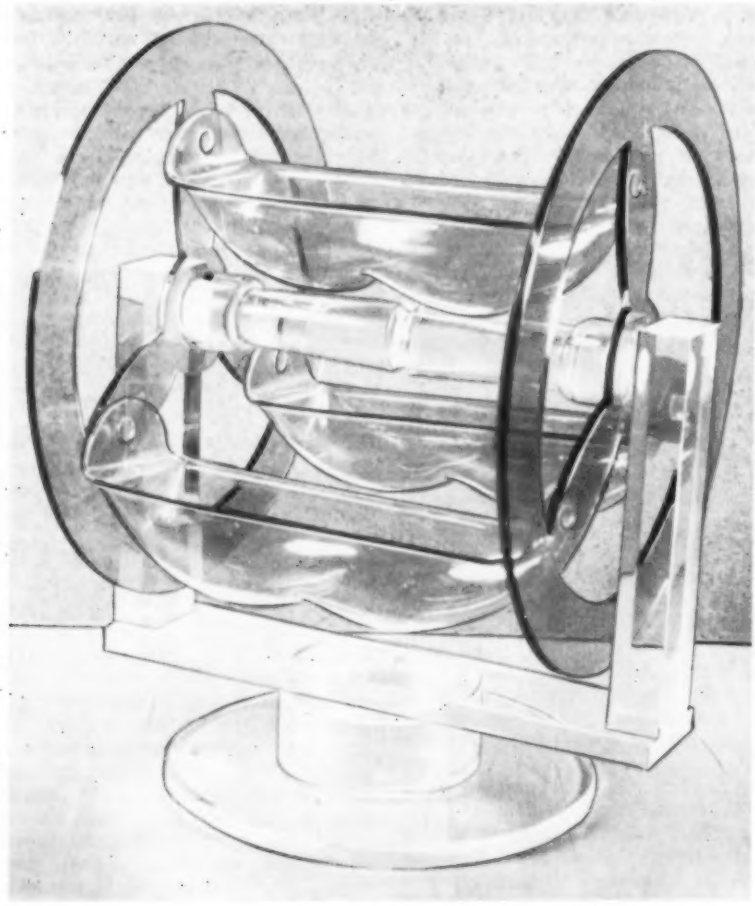
1. Lay out base 8 in. dia., by 1 in.
2. Saw out with band saw.
3. Glue wood disk on masking paper for use in assembling face plate. Stanley 7-70-7 glue is good for this. Clamp with pony clamps and allow to dry 24 hours.
4. Assemble on lathe and turn to desired shape.



Router carrier



Details of ferris-wheel lazy susan



Ferris-wheel lazy susan

5. Sand while on lathe.
6. Break the paper glue joint and buff.

Swivel

1. Lay out circle 4 in. in diameter of 2-in. stock.
2. Glue and assemble on lathe as base.
3. Make ring by cutting straight in with parting tool. Take center out.
4. Sand inside and outside of ring.
5. Remove from lathe and buff.
6. Turn out inside part of swivel.

Wheels

1. Make pattern for wheels as shown.
2. Lay out wheels from 12 in. dia. by $\frac{3}{16}$-in. material.
3. Drill holes for jig saw blade.
4. Cut out inside of wheels with jig saw.
5. Cut out the outside with band saw.
6. File, hand saw, and buff.

Axle

1. Lay out material for axle $1\frac{5}{8}$ by $1\frac{5}{8}$ by 8 in.
2. Saw grooves for line center and drill hole for tailstock center.
3. Sand corners off on disk sander.
4. Assemble in lathe and turn to desired design.
5. Sand while on lathe.
6. Remove from lathe and drill 1-in. holes in ends.
7. Saw off waste part of ends and sand.
8. Buff.

Uprights and Crossbar

1. Lay out to dimensions shown on drawing.
2. Saw out.
3. Machine sand.
4. Scrape with plane iron.
5. Hand sand and buff.

Mold for Lazy Susan Containers

1. Lay out from plywood 1 by 7 by 10 in.
2. Lay out and cut out inside of plywood 5 by 8 in.
3. Cut out soft rubber $\frac{1}{4}$ by 7 by 10 in.
4. Cut out inside of rubber $4\frac{1}{2}$ by $7\frac{1}{2}$ in. Sand $\frac{1}{2}$-in. bevel inside.
5. Fasten dowels in corners of plywood and in center. Dowels are $2\frac{1}{2}$ in. high.
6. Glue rubber on bottom of plywood.
7. Drill hole and run $\frac{1}{8}$-in. rod through center of mold.

Lazy Susan Containers

1. Lay out and cut out 3 pieces $\frac{1}{8}$ by 7 by 10.
2. Heat in oven 375 deg. F.
3. Using air forming press, the mold is placed on the hot plastic and blown to shape. We made our own forming press.
4. Take out of mold after plastic is cool and saw off excess plastic.
5. Sand and buff.
6. Drill holes for dowels.
7. Heat ends over outer heating unit and bend to 90-deg. angle.

Assemble

1. Glue ring of swivel to base.
2. Glue center part of swivel to crossbar.
3. Glue up dowels to crossbar.
4. Glue uprights to crossbar.
5. Drill 1-in. holes in wheels.
6. Glue dowels to wheels.
7. Glue wheels to axle.
8. Place wheels and axle in dowels of uprights.
9. Place Lazy Susan containers in place. Now it is ready to turn around or over, whichever the case may be, to get the desired goodies.

ESTABLISHING A PERSONNEL ORGANIZATION

FRED A. OLSEN

Washington Junior High School

Seattle, Wash.

Pupil-personnel organization in the industrial-arts shop may be unsatisfactory to the students, the instructor, or both. The organization plan being employed often does not appreciably contribute to the students' education because the plan does not promote the philosophy and objectives of industrial arts. In the minds of industrial-arts teachers therefore, the following question often arises: What is the best type of personnel organization plan to use?

Many articles have been written propounding the merits of various types of personnel plans, but to be valid, each plan should be founded upon logical, predetermined criteria. It is not enough that a plan be attractive, easily administered, and flexible to changing needs. It must also be an integral part of the industrial-arts program and it must augment the over-all effectiveness of the general education program. Therefore, a personnel organization plan should grow out of and supplement the philosophy and objectives of general education and, more specifically, of industrial arts.

The philosophy and objectives of secondary education have changed a

great deal in recent years. No longer are schools concentrating upon knowledge of subject matter, as was formerly the case; now the curriculum also includes the broader aspects of living in a democratic society as well. These broad goals of general education are readily apparent in the objectives established by the Educational Policies Commission:

1. The objectives of self-realization.
2. The objectives of human relationship.
3. The objectives of economic efficiency.
4. The objectives of civic responsibility.[1]

These objectives encompass the educational, sociological, and economic needs of youth, as well as the requirements for good citizenship. Therefore, if the industrial-arts program is to contribute its share in general education, the philosophy and objectives of industrial arts should evolve from and enhance the philosophy and objectives of general education.

Today's philosophy of industrial arts has developed concomitantly with the philosophy of general education. No longer is the industrial-arts program primarily concerned with the student's attaining skill in completing a sequence of exercises. Instead, there is an increasing tendency to build a course of study around student-inspired projects, such projects being more meaningful to the student than required exercises.

The vastly different and most important current educational change is the shift in emphasis from the development of skills in shopwork, toward the broader and more important aspects of successful living in a modern democratic society. The stress formerly placed upon the attainment of skill and manipulative ability in manual training is rapidly being left behind. And justifiably so, for now the industrial-arts program should be concerned with fulfilling its obligation in the total educational development of the student.

The following industrial-arts objectives embracing this philosophy have been compiled from industrial-arts literature and presented in a booklet by the American Vocational Association:

1. *Interest in Industry.* To develop in each pupil an active interest in industrial life and in the methods and problems of production and exchange.

2. *Appreciation and Use.* To develop in each pupil the appreciation of good design and workmanship and the ability to select, care for, and use industrial products wisely.

3. *Self-Realization and Initiative.* To develop in each pupil the habits of self-reliance and resourcefulness in meeting practical situations.

4. *Co-operative Attitudes.* To develop in each pupil a readiness to assist others and to join happily in group undertakings.

5. *Health and Safety.* To develop in each pupil desirable attitudes and practices with respect to health and safety.

6. *Interest in Achievement.* To develop in each pupil a feeling of pride in his ability to do useful things and to develop worthy leisure-time interests.

7. *Orderly Performance.* To develop in each pupil the habit of an orderly, complete, and efficient performance of any task.

8. *Drawing and Design.* To develop in each pupil an understanding of drawings and the ability to express ideas by means of drawing.

9. *Shop Skills and Knowledge.* To develop in each pupil a measure of skill in the use of common tools and machines and an understanding of the problems involved in common types of construction and repair.[2]

These specific objectives are a logical outgrowth of a dynamic philosophy of industrial arts and the objectives of general education.

It is toward these goals that the efforts of the teacher should be directed in all facets of the shop program. That is, the teacher should embody the philosophy and objectives of industrial arts in all shop activities. So far as the particular personnel plan being employed is concerned, therefore, that plan should be a substantiating part of the total educational development of the student.

A good personnel organization probably makes its greatest contribution in the formation of the socially minded student. This is development away from individualistic or egocentric traits toward behavior that is sociocentric in nature. Where such a desirable personnel plan is in use, there is an aura of sincere good fellowship and co-operation among the students and adequate rapport between students and instructor.

However, the personnel plan in itself is nothing more than a listing of names and assignments. It therefore becomes the responsibility of the instructor to obtain the greatest possible educational values from the plan. Fulfilling the objectives of industrial arts does not occur haphazardly, but is the result of deliberate design. It is up to the teacher to employ methods and techniques of personnel organization that are conducive to the attainment of these objectives.

Criteria for establishing a personnel organization should, therefore, be based upon principles that are a logical derivation from the philosophy and objectives of industrial arts. Principles, which provide a foundation upon which a successful pupil-personnel organization plan may be erected, are as follows:

1. The plan should help the student develop a knowledge and appreciation of industrial life.

2. The plan should foster democratic principles and practices.

3. The plan should help the student develop an attitude of co-operation and service to others.

4. The plan should help the student develop habits of orderliness and self-discipline.

5. The plan should help the student develop confidence and self-reliance.

6. The plan should help the student develop desirable habits, attitudes, and ideals.

Criteria for personnel organization may be divided according to mechanical and educational aspects of the plan. Mechanical criteria are concerned with physical make-up; educational criteria are concerned with the manner in which the personnel plan is employed.

Although the manner in which the instructor employs any personnel plan is probably the most important factor in its success, the mechanics of the plan have a great deal to do with its ease of administration. Mechanical criteria of the personnel plan are those structural features facilitating achievement of the preceding principles, thereby providing assurance that the plan will contribute its share in fulfilling the objectives established for industrial arts. The following mechanical criteria should be considered in the development of any personnel plan:

1. *There should be rotation or provision for advancement of personnel.* Students should have equal opportunity to perform the varied tasks of the assignment plan. That is, a student should not be kept on one cleanup assignment for the entire course simply because he does that job well. This alternation of assignments is perhaps most easily accomplished with a rotation-type plan, especially if the rotation is to occur as frequently as every week or oftener.

However, provision can be made in the line and staff organization for the alternation of assignments. This alternation can be based upon advancement according to merit or simply alternation with little regard for a pupil's qualifications. Some provision should be made for the periodic changing of assignments if students are to realize the maximum educational benefit from the personnel plan.

2. The personnel plan must be flexible to meet a variety of situations.

[1] National Education Association, Educational Policies Commission, *Policies for Education in American Democracy*, Washington, D. C., p. 192.

[2] American Vocational Association, *A Guide to Improving Instruction in Industrial Arts*, A Revision of Standards of Attainment in Industrial Arts and Improving Instruction in Industrial Arts, Washington, D. C., 1953, p. 18.

Variables such as class size, absences, or assignment changes should not hinder the effectiveness or ease of administration of the plan.

3. *All assignments should be clearly defined and detailed.* A student must fully understand the nature and extent of an assignment before he can be expected to complete it satisfactorily. Each assignment should therefore be defined on the personnel plan; the extent of that assignment can be explained more fully if needed, in the area where the job is to be done. For example, the student assigned to checking-in-tools could have more detailed instructions conveniently posted on the tool panel. All instructions should be brief, yet fully explanatory.

4. *The plan should be simple and self-administering.* Logically, the plan that is difficult to understand is also difficult to administer. When a student has trouble figuring out his assignment, he will by that time, have lost much of his initiative for doing the job. For a plan to be self-administering, it should be readily understandable to all.

5. *The plan should be attractive.* There is a psychological advantage in having a neat, well-designed plan. Students will carry out their assignments efficiently and with more pride when they can be justifiably proud of their personnel plan. A plan that is initially attractive can, in a short time, depreciate in appearance from an accumulation of dust, scratches, and smudges. Considering the psychological effect upon students, it is well worth the instructor's time to keep the personnel plan in good physical repair.

6. *The plan should clearly identify those responsible for assignments.* There will be less tendency for the students to shirk responsibilities when assignments are clearly designated. Where squads are frequently used, as in the rotation plan, the responsibility for the assignment is a co-operative one. The tendency for some squad members to *forget* their assignments can be almost totally eliminated by a competent squad leader. A plan that clearly identifies responsibilities makes it easy for the shop foreman or superintendent to check on the completion of assignments.

7. *There should be time allotted for "breaking in" new personnel officers.* The time required for training a new officer is dependent upon the complexity of the assignment and the ease with which the new officer is able to orient himself to the nature of the task. A weakening of the whole personnel organization will result if new officers are poorly trained and therefore unable to fulfill their official positions adequately.

8. *The plan should relieve the instructor of managerial duties, thereby allowing more time for instruction.* Those assignments which have educational value and which can be capably performed by the students are best assigned to them. It is to be remembered that the managerial relief — and resulting extra time — accruing to the teacher because of personnel plan should be put to constructive use. Improved planning, instruction, and evaluation by the teacher should be apparent results of such relief from managerial functions.

9. *The personnel plan should be able to function in the absence of the instructor.* This is the supreme test of the mechanical efficiency of the organization. In short, the plan must be self-administering to the extent that the instructor may leave the room at any time during the period and be reasonably sure that the plan will continue to function efficiently. There are times when the students will have to accept this responsibility because the regular instructor may be absent because of illness or be in conference with parents, officials, or visitors.

Criteria Regarding Educational Aspects of Personnel Organization

Educational aspects of personnel organization are those criteria concerned with the administration of a personnel plan. These criteria take into account the principles of personnel organization and are subsequently a direct outgrowth of the objectives of industrial arts. Therefore, because these criteria have a direct bearing upon the amount of educational benefit the student will derive from personnel organization, they are listed and explained as follows:

1. *The plan should be democratic in principle as well as in function.* A plan could conceivably embody many democratic principles but still not function in a democratic manner. In other words, the personnel plan should be both organized and regulated according to democratic practices.

The form of organization used, whether rotation or line and staff, has little to do with the determination of the presence or absence of democratic principles and functions. Rather than by the physical nature of the plan, democratic organization and function are characterized by student participation in deciding how and when assignments are to be assigned and rotated. Only in this way will the students derive maximum educational benefit from personnel organization.

2. *The function of the plan should be decided upon by the pupils and teacher working together in a democratic manner.* The teacher should first explain and interpret the plan so that students have some conception of its democratic operation. From this point forward the administration of the plan is the joint responsibility of students and instructor working together, and that responsibility should be a continuous process. A teacher's democratic attitude during the first week of school should not degenerate into one of autocracy at a later date. Such a change is soon felt and imitated by the students.

Instead, the instructor and student leaders in the plan should meet frequently to discuss problems and iron out any difficulties or differences of opinion. Only in this way will students derive the greatest benefit from personnel organization.

3. *In organizing personnel, there should be a co-operative plan for making the initial assignments.* Here again the course to take should evolve from the wishes of the students — guided by their instructor. The students may elect their officers and staff, select them alphabetically, or propose that the teacher select them at his discretion.

The teacher should encourage the first method, the election of the officers and staff. Not only is this the most democratic procedure, but it will enhance chances for success of the plan because leaders were chosen by the majority. Then too, the pupils often know the qualifications of their peers more thoroughly than does the teacher.

However, an instructor must reserve the right to select his own officers if the pupils do not exercise their right in a serious vein. Rarely will this indifference occur, but the instructor should be prepared for any such possibility.

4. *The personnel plan should provide both opportunities for the development of leadership and acceptance of responsibility under leadership.* With an adequate personnel plan, students have an excellent opportunity to determine their own abilities in leadership or to learn if they would rather accept responsibility under the guidance of others.

Also, boys need to develop attitudes that will help them attain success in relationships with their associates. A personnel plan can help them achieve these attitudes through the development of leadership and service to others. Through alternation of assignments each boy has the opportunity to *give* as well as *take* orders. In this way he will develop reciprocal attitudes of co-operation, will better understand the problems and grievances of others and will learn to act accordingly.

5. *Activities of the personnel organization should flow through the chain of authority.* The chain of command

should first be decided upon by the students and teacher working together. That chain of authority should be directed toward the typical line and staff plan of industry, both in nomenclature and order of authority.

The order of authority is readily apparent in the line and staff plan. A teacher using the rotation plan can better indicate his chain of command by using a supplemental sheet to describe the line of authority; he should also point out that order of authority to his students. A student's knowledge of his position in the plan will help that student function most effectively in his leadership or subservient capacity.

By following a chain of command, the instructor will be relieved of a whole host of insignificant details that could be better handled by the students themselves.

6. *The plan should provide for individual as well as co-operative group effort.* Some assignments should involve individual effort; others should be a co-operative group undertaking. Through individual assignments, students will develop self-confidence, reliance, and pride in an individual achievement well done. In group efforts, students will have an opportunity to develop co-operative attitudes as well as to be of service to their fellows. Working together in this manner is an excellent way of learning to live harmoniously with others in a democratic atmosphere.

7. *The activities included in the plan should evolve from and be designed to meet the needs of a specific situation.* The basis for inclusion of any activity is assurance that the activity will definitely be a contribution toward the philosophy and objectives of industrial arts.

The successful personnel plan will, therefore, include only those assignments that are practical and necessary, and which fall within the realm of established philosophy and objectives appropriate to a particular locale. If this policy is followed, all assignments that could possibly be termed *busy work* will be excluded. Any assignment, before it is included in the plan, must first be necessary and then be designed to meet valid objectives.

8. *Operation of the personnel plan should correlate the industrial-arts program with other subjects.* This correlation can be accomplished in several ways. First, letters of application for shop positions can be used concurrently with assignments in English; one good method is that of requiring students to write such letters to obtain a position in the personnel organization itself. Promotions or transfers in personnel organization could be, to an extent, contingent upon students' letters of application. In this way it is possible to arouse interest in English, a subject often ignored by shop students.

The democratic procedure followed in personnel organization exemplifies our American way of life and can be readily correlated with the study of government or civics. Students, using their knowledge gained in civics, can prepare a plan for the democratic election of personnel officers.

Correlating the industrial-arts program with other subjects through the personnel plan is also an excellent means of advertising the shop program. The industrial-arts program need not be isolated from the rest of the curriculum.

It is readily apparent from the preceding explanation of the educational and mechanical aspects of pupil-personnel organization that criteria do not function alone. Instead, they are in considerable measure interdependent. That is, mechanical criteria are dependent upon and insure the success of educational criteria and vice versa. The success or failure of any personnel plan is consequently dependent upon the principles and criteria present.

The difficulty of developing an adequate pupil-personnel plan lies in the fact that criteria are not universal in extent, nature, or application. Criteria appropriate for one day, age, and situation may not be suitable for another. It is because our philosophy of industrial arts is an evolving philosophy, never static but in constant flux to meet the demands of a changing society, that our criteria for personnel organization must respond in like manner.

Therefore, if a student taking a course in industrial arts is to reap the total educational benefit of pupil-personnel organization, the plan employed should be based upon criteria that have been derived from the philosophy and objectives of general education and industrial arts.

JUNIOR HIGH DRAFTSMEN BECOME JUNIOR ARCHITECTS

GERALD H. JONES
Instructor of Industrial Arts
O. Henry Junior High School
Austin, Tex.

If you want to create interest in your drawing class, here is an idea that might interest you. Let the students climax their semester's work by building a scaled miniature house that is an exact duplicate of any home built today. It can easily be organized to produce an excellent teaching aid, that will inspire many classes to come.

In order for the entire class to work together accurately, each student had to work from an exact duplicate of the same floor plan. This was accomplished by the use of templates. Then wall sections and terminology of wall sections

Fig. 1. Here four boys look at the "Master Plan." This is what all work was checked against to eliminate errors

were studied until all could understand construction terminology.

The students were assigned the various walls, the foundation, door schedule, window schedule, etc. Students having door or window schedules had to complete theirs first; then they copied on the board and explained their schedule so each student could transfer this to his own set of plans. With this knowledge, each made a complete layout of his wall assignment. This included each stud, header, and cripple for all doors and windows within that wall. After this drawing was checked, the actual construction began. The boys worked in groups of two or three on most assignments.

Fig. 2. This is how each wall was constructed. A layout drawing was made, and each stud, etc., was placed directly over it, and glued in place. Waxpaper was placed over the drawing to prevent wood from sticking to the drawing

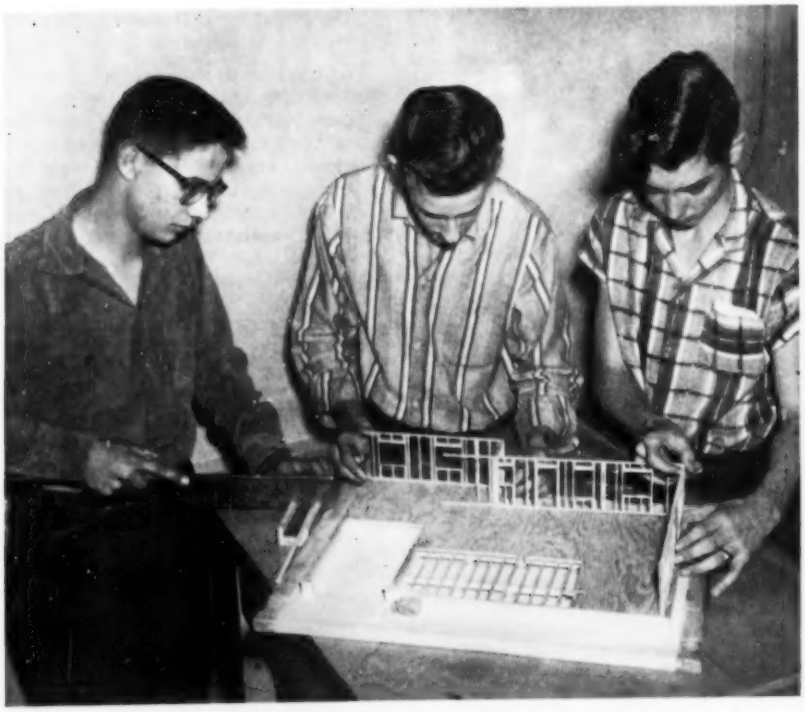


Fig. 3. Foundation completed, exposing cross-section of piers, girders, floor joist, and subflooring. The first walls are glued in place

The boys brought apple boxes and crates from which all studs, joists, and girders were made. The piers were made from ½-in. dowel rods. Some boys cut wood, some did layout work, and others glued the tiny walls together until the the wall began to take shape.

With our ⅜ in. equals 1 ft. scale, the foundation and walls could be placed directly upon the *master plan* to check each wall's accuracy. The boys had to work together to see who would make the various tees and corner posts on adjoining walls.

Since textbook material was limited, the house plans the boys brought in and the class lectures were our primary source of information. Field trips are also an excellent source of visual information.

When the walls were almost completed, some boys started on the roof design and rafter construction. The rafters had to be drawn out on paper to a 4–12 pitch. A template was made and the rafters were cut. The entire roof was constructed and braced so it could be lifted off the walls in order to study the minute details of the wall construction.

Once the house was completed, the boys made tracings of the foundation plan, floor plan, and the elevations. This completed their set of plans.

This was the manner in which our small house was completed from top to bottom. Idea, initiative, planning, and finally the production — it all spelled out a profitable experience for both the students and the instructor. (See Figures 4 and 5 on page 268.)

When NATO was born in 1949 the free nations of Western Europe would have been hard-pressed to put 1000 planes in the air from 20 airfields that could accommodate jet planes. Today NATO can put up more than 6000 planes, operating from nearly 200 jet airfields. Nearly 4000 miles of fuel pipelines have been laid to link the airfields, along with an impressive telecommunications system and a screen of air-raid warning stations. — *Wisconsin Military District Information Office.*

Working with pine that looks as if it needs a filler? You can fill and finish with a thinned coat of fresh, white shellac. Another shellac coat when the first is dry will add beauty. — *Shellac Information Bureau.*

Fig. 4. More walls being fitted and glued, each wall fitting into place as planned. All outside walls now complete

(See article on page 266)

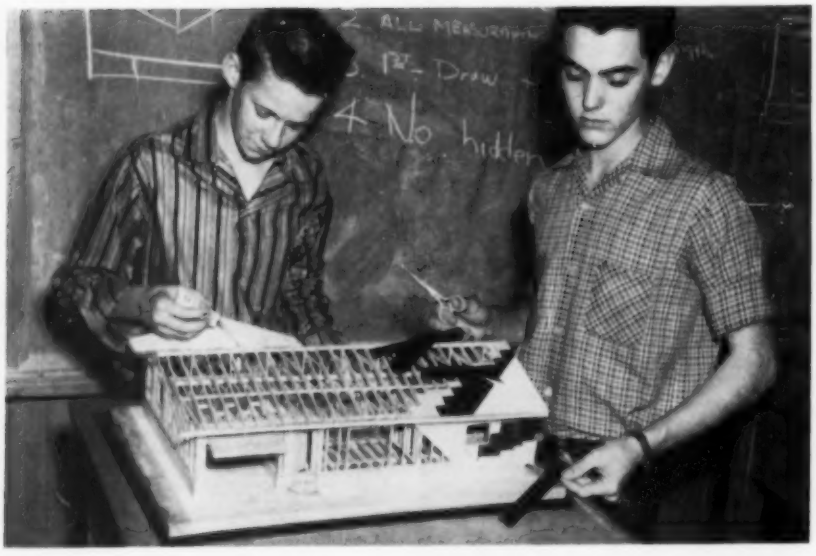


Fig. 5. These two students put on finishing touches. The house exposes all phases of the construction — the framing, decking, and siding, felt paper, and then small sections of the finished siding

SALARY SCHEDULING

JOSEPH LONGO

Director, School of Vocational and Adult Education

South Milwaukee, Wis.

In considering educational personnel, it is important to recall that there are many functions to be performed in a school system. According to A. S. Barr, in his article "Merit Pay for Teachers," it is customary to classify the educational personnel into three broad categories: (1) administrators; (2) teachers; and (3) those providing special service of various sorts.

In considering the economics of salary scheduling it is probably worth recalling that current practice recognizes differences in the demands of positions in all occupations. Superintendents, union leaders, and specialists usually receive more pay than common labor.

Salary scheduling is both a hard job and an important one. There is room for an honest argument on about every decision made and the outcome of the decisions affects the very heart of the educational purpose for which the schools exist. The quality of children's growth and learning, both in school and out is influenced profoundly by the quality of teaching. The quality of teaching, in turn, is influenced profoundly by the salary policy of the school district.

The Need for a Definite Salary Schedule

For teachers in many school systems, the idea of having to argue the need of a salary schedule is an echo from the Stone Age. However, the superintendent of schools, Franklin, N. H., Donald W. Dunnan, in his article "The Advantages of Salary Scheduling in Smaller Communities," in the October, 1950, issue of *American School Board Journal* says: "Few communities in the United States, employing one hundred or more teachers, attempt to deal with the problem of teachers' salaries without a formal schedule."

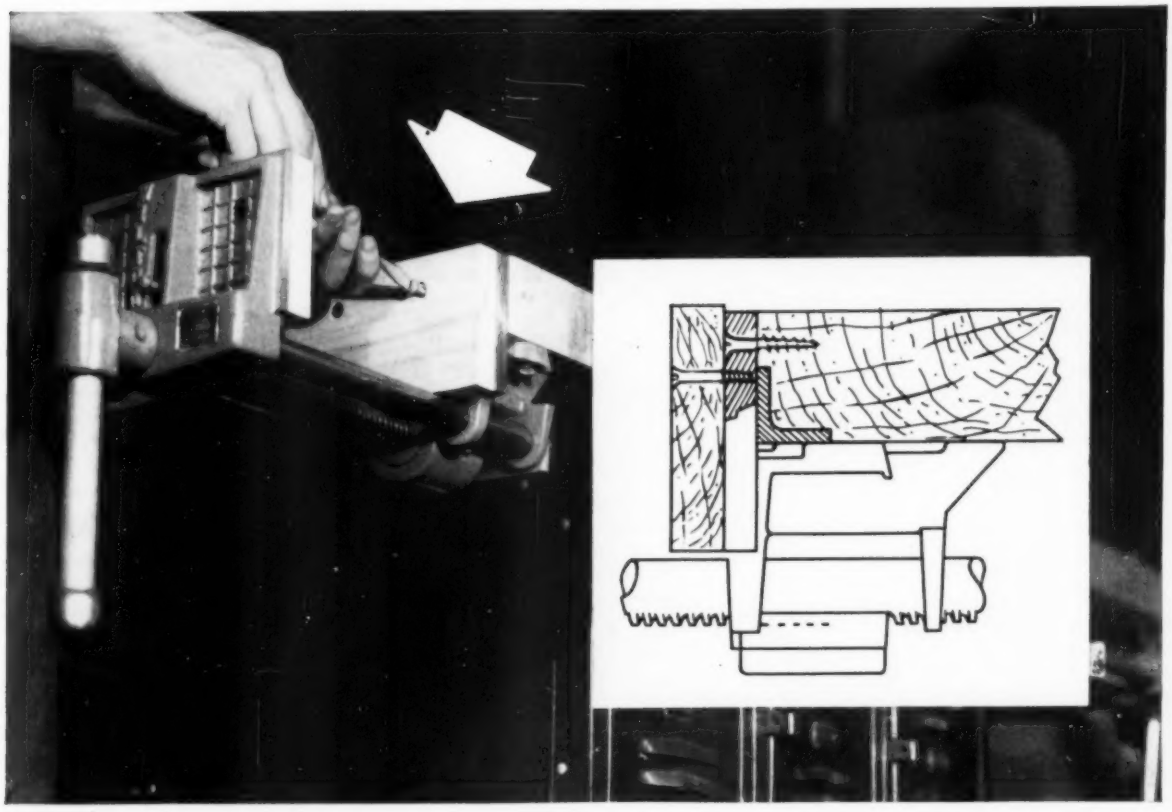
He states further:

> Many of the salary schedules now in operation have been developed without a great deal of scientific research behind them, with the "going wage" in the area as the criterion for determining what should be paid. Consensus among those employing salary schedules is that such a plan is superior to a year-to-year haphazard method of establishing wages.

Concerning the smaller communities he says:

> In very small school districts employing ten or fewer teachers, salaries established on the basis of school board opinion and individual negotiation may possibly be defended

(Continued on page 24A)



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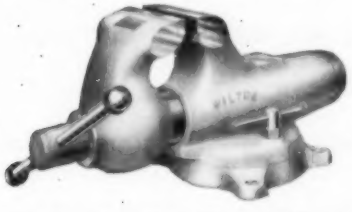

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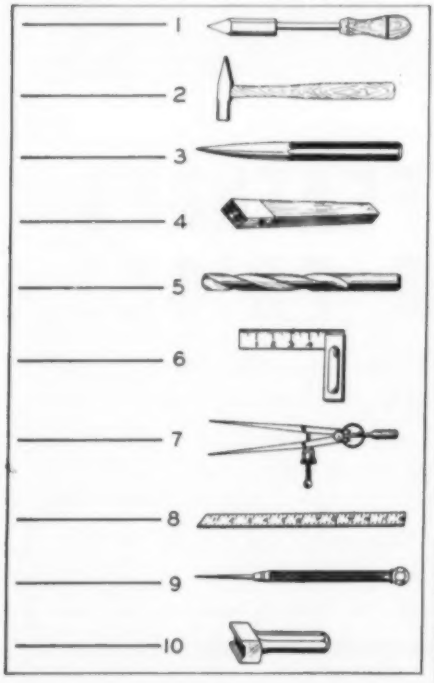
ACHIEVEMENT TEST FOR NINTH-GRADE GENERAL METALWORK

DONALD G. LUX
Assistant Professor
Department of Industrial Education
University of Illinois
Urbana, Ill.

General Directions: This test will take approximately 45 minutes. Do not wait for further directions after your teacher tells you to begin. Carefully read the directions for each group of questions and work until you complete all the items or are asked to stop. Skip any item you cannot answer and return to it if you have time. If you finish before time is called turn your paper over and wait for the rest of the class.

Part I. Recognizing Common Metalworking Tools

Directions: Each of the following ten drawings represents some common metalworking tool. Place the correct name of each tool in the blank to the left of the drawing.



Common metalworking tools

Part II. Choosing the Correct Answer

Directions: Underline the correct answer and then place the number of that answer on the blank to the left of the question or statement.

.... 11. The acid used to etch aluminum is: (1) nitric, (2) acetic, (3) hydrochloric, (4) sulphuric.

.... 12. The acid used to etch copper is: (1) nitric, (2) acetic, (3) hydrochloric, (4) sulphuric.

.... 13. Mild steel is: (1) more costly than steel used for tools, (2) less costly than steel used for tools, (3) really cast iron, (4) also called tool steel.

.... 14. Tool steel contains: (1) more carbon than mild steel, (2) more carbon than cast iron, (3) more carbon than any other metal, (4) less carbon than mild steel.

.... 15. A sheet-metal box 1 in. deep, 3 in. wide, and 5 in. long with an allowance for a ¼-in. single hem should be made from a piece of metal that measures: (1) 5¼ by 7¼ in., (2) 4½ by 6½ in., (3) 6 by 8 in., (4) 5½ by 7½ in.

.... 16. When filing aluminum you need a: (1) smoother file than for steel, (2) smaller file than for steel, (3) coarser file than for steel, (4) flat file.

.... 17. The tool used to thread the inside of a hole is called a: (1) tap, (2) reamer, (3) die, (4) ratchet.

.... 18. Casehardening is used to harden: (1) cast iron, (2) tool steel, (3) mild steel, (4) bronze.

.... 19. Which of the following requires a *higher* temperature: (1) hardening, (2) tempering, (3) casting, (4) annealing?

.... 20. Which of the following requires a *lower* temperature: (1) hardening, (2) tempering, (3) casting, (4) annealing?

Part III. True and False

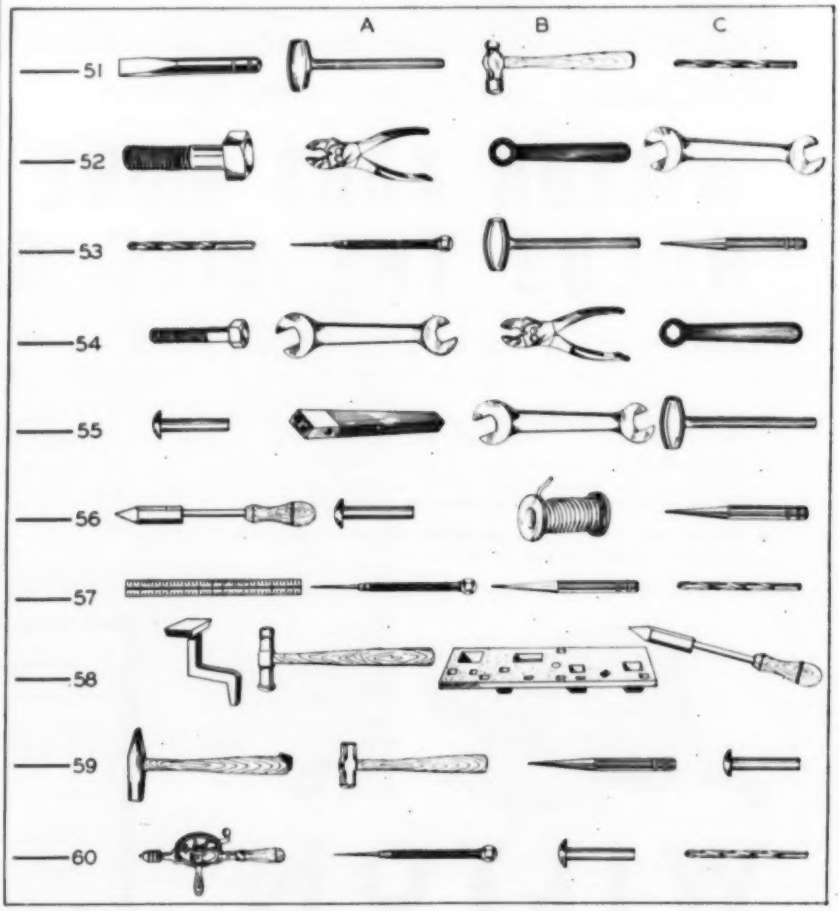
Directions: Each of the following statements is true or false. If you believe a statement is true, write the word *true* on the blank before the statement. If you believe a statement is false, write the word *false* on the blank.

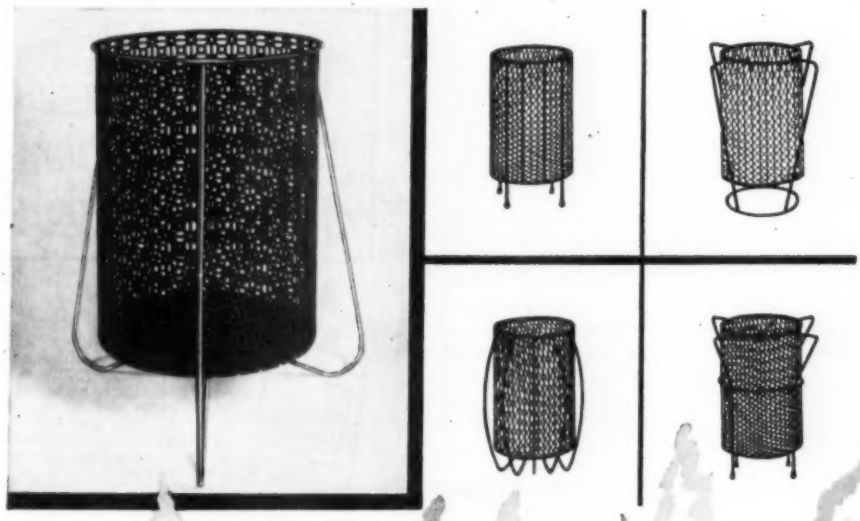
.... 21. A hack saw should cut on the forward stroke.

.... 22. The United States has enough ores of all the common metals to last hundreds of years.

.... 23. Carriage bolts are chiefly used to fasten wood and metal together.

(Continued on page 22A)





Project No. 1 is typical. It provides a large illustration of a smart metal waste basket. This is followed by a variety of drawings suggesting other ways of handling the same project. These various designs induce the student to decide what he wants, even to developing his own design — the project becomes **"his"** by choice.

8 NEW IDEAS

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These materials are intended to help students toward eventual personal refinement of detailed project plans. Some probably will want to build designs from this folder. Others will further adapt some of the enclosed ideas. However, all should be encouraged to evolve projects of their own design. In any case, students are expected to develop their own dimentioned working drawings, bills of material, and procedural plans.

Students who build projects along the lines proposed in this folder will gain an understanding of practical design criteria and techniques. They will also increase their knowledge of kinds and characteristics of metals and of common metal forming tools, machines, and processes. Furthermore, the total learning should be increased because the experience will be both educational and personally satisfying, since each individual will make a project *he* designed and planned.

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9TH GRADE TEST

(Continued from page 20A)

.... 24. Stove bolts can be purchased in many more shapes and sizes than machine screws.
.... 25. A piece of steel rod having no head but threaded at both ends is called a stud.
.... 26. A castellated nut is one with eight sides.
.... 27. A die is used to cut threads on the outside of a pipe.
.... 28. Copper is heavier than aluminum.
.... 29. Cutting threads on the inner surface of a hole is called reaming.
.... 30. A tap would be used to thread a nut.

Part IV. Matching Related Items

Directions: Each item shown below numbered 1 to 15 is most closely related to only one of the items in the group numbered 31 to 40. Place the number of the matching item in the blank before the number which it matches.

.... 31. solder
.... 32. tin plate
.... 33. flux
.... 34. aluminum
.... 35. galvanized
.... 36. cold rolled steel
.... 37. copper
.... 38. bronze
.... 39. hot rolled steel
.... 40. annealed

1. refrigerators
2. zinc coated
3. sal ammoniac
4. copper and tin
5. tin and zinc
6. rosin
7. aluminum and copper
8. acid proof
9. railroad cars
10. softened
11. steel coated with tin
12. copper and zinc
13. tin and lead
14. used to make aircraft
15. best common conductor

Part V. Completing the Question

Directions: Write the correct answer to the question on the blank in front of the question.

.... 41. What per cent pure gold is 12-karat gold?
.... 42. Is sterling silver pure silver?
.... 43. What metal is the principal alloying element in both bronze and brass?
.... 44. Is the United States one-cent piece pure copper?
.... 45. Which metal is stronger, steel or aluminum?
.... 46. Is aluminum a pure metal or an alloy?
.... 47. Does tin rust?

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A modern, ready-to-use polyvinyl resin glue for general interior use. Perfect for dowels, paneling, inlays, marquetry, cloth, paper and all porous materials. Fast setting, dries clear. Available in refillable plastic squeeze bottles, tubes, jars and drums from ¼ oz. to 5 gal.

FOR NO CLAMP GLUING

Regular and nonflammable cements that bond on contact. Strong, water-resistant and heat-resistant. Best you can use for plastic laminates, plywood wall panels, leather, linoleum, synthetic rubber, thin gauge metal and all dissimilar materials. Comes in cans and drums from 1 pint to 5 gallons.

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Completely waterproof two-component resorcin resin glue forms a bond stronger than the wood itself. Resists continuous outdoor exposure, cold and boiling water, moist and dry heat, mold and fungus, solvents, acids and alkalis. Unbeatable for boats, outdoor furniture, sports equipment. Packed in ¼ pint to 5 gallon units.

FOR STAIN-FREE WOOD GLUING

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For complete information and prices, contact your supplier or write The Borden Chemical Company (a division of The Borden Company), 350 Madison Ave., New York 17, New York.

.... 48. Is a forming roll used in sheet-metal work?
.... 49. Do metalworkers make up as much as 10 per cent of the United States labor force?
.... 50. Is the principle of alloying metals a recent discovery?

Part VI. Recognizing Related Items

Directions: One of the right-hand three drawings most nearly matches the drawings numbered 51 through 60. Place the letter of the matching drawing in the blank to the left of the item which it matches. See page 20A.

Part VII. Choosing the Correct Answer

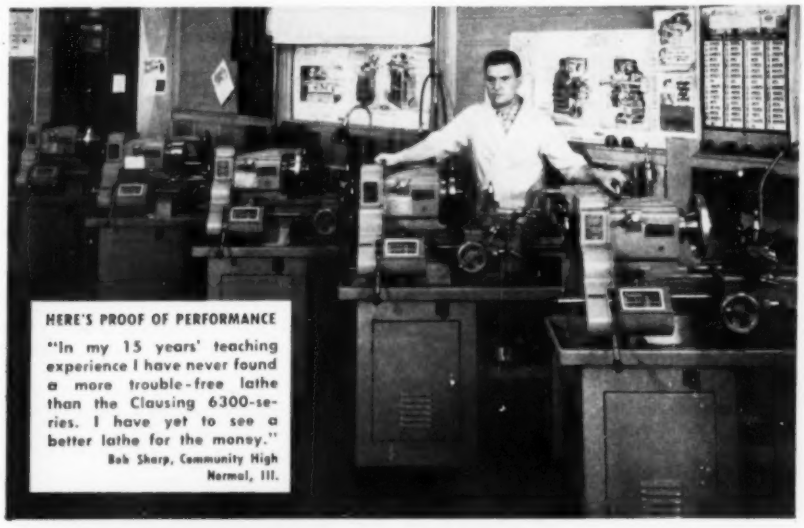
Directions: Underline the correct answer and then place the number of that answer in the blank before the question.

.... 61. When steel is heated it: (1) contracts, (2) weighs more, (3) expands, (4) is stronger.
.... 62. Aluminum is used to make planes because it: (1) does not rust, (2) is shiny, (3) is light, (4) is stronger than steel.
.... 63. Which is our most commonly used metal: (1) iron, (2) copper, (3) lead, (4) aluminum.
.... 64. An alloy is a metal made from: (1) iron ore, (2) two metals, (3) two or more metals, (4) three metals.
.... 65. Heat treating is a process for changing the: (1) characteristics of metals, (2) weight of metals, (3) shape of metals, (4) color of metals.
.... 66. Cast iron was first used: (1) in 1872, (2) in 1605, (3) in 1460, (4) before the time of Christ.
.... 67. Steel is made from pig iron with: (1) zinc added, (2) some carbon burned out, (3) sulphur added, (4) chromium added.
.... 68. Stainless steel is more rust resistant than plated steel because the: (1) plating is thicker, (2) entire material is rustproof, (3) stainless costs more, (4) stainless costs less.
.... 69. U. S. steel production is *not* dependent upon: (1) limestone, (2) coal, (3) scrap iron, (4) zinc ore.
.... 70. The tool post on a lathe: (1) holds the cutter bit, (2) is scaled off in thousandths, (3) is used to hand tools on, (4) turns clockwise.

KEY

1. soldering copper	11. 3	21. true
2. riveting hammer	12. 1	22. false
3. center or prick punch	13. 2	23. true
4. rivet set	14. 1	24. false
5. twist drill	15. 4	25. true
6. try square	16. 3	26. false
7. divider	17. 1	27. true
8. steel bench rule	18. 3	28. true
9. scriber	19. 3	
10. hand groover	20. 2	

(Continued on next page)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"In my 15 years' teaching experience I have never found a more trouble-free lathe than the Clausing 6300-series. I have yet to see a better lathe for the money."
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CLAUSING 6300-series 12¾" LATHES—TOPS for safety . . . performance . . . and value

Bob Sharp's enthusiastic endorsement is not unusual. Instructors everywhere report Clausing lathes set the standard for safety, rugged construction, ease of operation, and VALUE!

Consider these features: Headstock, apron and quick-change are *totally enclosed* . . . fingers can't get into these danger zones, nor can dirt or chips. All gears and shafts travel in bath of oil. *All* controls are *outside* the machine. Spindle nose is tapered key-lock . . . eliminates danger of chuck run-off on braking or reversing.

Flame hardened bed ways for longer wear are standard equipment *at no extra cost*. Spindle turns on Timken "Zero-Precision" tapered roller bearings. Lead screw has easy-to-replace shear pin.

Underneath drive . . . no exposed belts or pulleys. Heavy-duty ball bearing countershaft. Two V-belts drive the spindle . . . belts are outboard for easy replacement.

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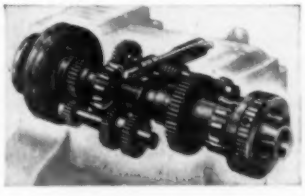
Quick-change box, too, is totally enclosed and gears and shafts turn in bath of oil . . . another important safety and long-service-life feature exclusive with Clausing in lathes of its class.



Enclosed construction of headstock provides greater rigidity, safety . . . longer service life. All gears, shafts and bearings travel in a pumped bath of oil.

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Swing over bed	12¾"
Between centers	21½", 33½", 47"
Hole thru spindle	1⅜"
Thread range	54 selections, 4 to 224 Standard right or left
Motor recommended	1 or 1½ HP, 1 or 2 speed

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CLAUSING DIVISION
Atlas Press Company
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9TH GRADE TEST

(Continued from previous page)

29. false
30. true
31. 13
32. 11
33. 6
34. 14
35. 2
36. 1
37. 15
38. 4
39. 9
40. 10
41. 50 per cent
42. no
43. copper
44. no
45. steel
46. pure metal
47. no
48. yes
49. yes
50. no
51. B
52. C
53. C
54. C
55. A
56. B
57. A
58. B
59. C
60. C
61. 3
62. 3
63. 1
64. 3
65. 1
66. 4
67. 2
68. 2
69. 4
70. 1

SALARY SCHEDULING

(Continued from page 268)

The tendency on the part of board members in the very small school districts to accept as a valid criterion for establishing the minimum wage as the lowest salary that must be paid to fill a position has been unfortunate. A much more sensible approach would be to determine how much the community could afford to pay to fill a particular position, then to seek the best qualified person available at this wage.

In this article we have found that a third of the cities and even more rural-school districts have no definite salary policy. For those places individual bargaining and all its attendant ills of personal favoritism, wire pulling, and low morale are still the rule. Salary schedules prevent the sense of injustice that is created when haphazard salary rates prevail. Haphazard salary rates are merely the policy of greasing the wheel that squeaked the loudest. Some "squeakers" profit while the meek may suffer.

Advantages of Salary Scheduling

The purpose of this paper is to point out the advantages of salary scheduling. Mr. Dunnan has observed that communities which have adopted salary schedules have, in very few instances, abandoned them.

The cornerstone of any sound salary policy is that it be definite. The salary schedule should represent a decisive and binding policy of the board of education. There is doubt as to whether teacher morale is lower under known conditions of individual bargaining than in a situation where a salary schedule exists on paper but is cynically disregarded as expediency may suggest.

Many boards follow both the letter and the spirit of fixed and definite salary schedules and earn dividends for the schools in teacher security and confidence. When the school administration faces the real alternative between a definite schedule and a process of individual bargaining the decision is almost certain to be in favor of a schedule.

Minimum and maximum amounts for each salary class, in the schedule, with fixed increment steps in advancing from the minimum to the maximum, are essential.

1. These features promote higher morale among school employees by making it possible for them to plan with confidence.

2. Provides for improved budgetary practices by enabling the board of education or superintendent to estimate budget needs and to adjust finances accordingly.

3. Removes from the school board and superintendent one major administrative headache by preventing the sense of injustice that is created when haphazard salary rates prevail.

Minimum

How much should a teacher be paid and how much is a teacher worth?

The answer to these questions depend upon other factors.

1. Qualifications of the teacher.

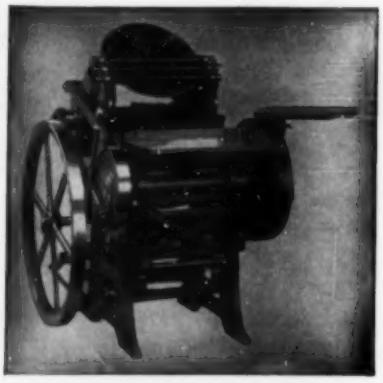
2. Standard of living in the community.

3. Current purchasing power of the dollar.

4. The value which the community,

(Continued on page 26A)

C&P NEW SERIES PRESSES These presses in sizes of 8x12, 10x15, 12x18 and 14½x22, provide the student with equipment that furnishes all practical requirements of hand fed press operation. May be equipped with flywheel, belt and platen guards. Also furnished for treadle operation instead of motor drive.



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***"HANDBOOK OF PLATEN PRESSWORK"** is one of the outstanding aids to printing furnished without charge to printing instructors. If you do not have a copy, just request one.*

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New Industrial Arts Electricity-Electronics Course Called "Revolutionary" ... "Coordinated"

HOWARD O. MEUCHE

President, Universal Scientific Co.

Vincennes, Indiana

With interviews of hundreds of Industrial Arts Instructors still ringing in our ears, and the surveyed opinions of forty state school heads, Universal Scientific Co. announces a forthcoming CROW Course entitled, "Industrial Arts: Beginning Electricity — Electronics — Model 30," which is indeed revolutionary.

Our field researchers were told to isolate the problem and after several months turned up nine very revealing facts:

1. Students need a basic understanding of tools, materials and ideas in solving problems.
2. Student learning potential is being handicapped by lack of coordinated teacher's manuals, pupil instruction sheets, demonstration equipment and activity sheets.
3. Convenient length instructional units (of one or two weeks) are needed — with second or third units available where necessary.
4. Units of the course should be complete enough in themselves to allow flexibility of teaching order, so the teacher can select his own starting subject.
5. Courses should be compatible with variations of needs (9, 18 and 36 weeks courses). Subjects should also be flexible enough to be arranged for complete single subject coverage, allowing for lost time and vacations.
6. A safety unit which may be taught in sequence with other units was requested.
7. Take-home project suggestions should be included; probably in the student's manual.
8. Teachers should be given a better understanding of materials and equipment available — and how they would fit their needs.
9. While there are seemingly more funds now available for teaching materials, instructors are hesitant to know which material is adequate and best.

With interest peaked by these somewhat alarming facts, we could think of no more qualified counsel to assist us in preparing a CROW Course to solve these multiple problems than Dr. William A. Kavanaugh, University of Minnesota Department of Electricity — Radio Electronics.
(See Inset).

After our conclusions with Dr. Kavanaugh and his extensive preparation in coordination with our engineering staff, we named the resulting CROW Course, "Industrial Arts: Beginning Electricity — Electronics, Model 30." It is the first complete and flexible course for these subjects and those related to them. It is effectively and efficiently divided into ten units. All or a part may be combined for the complete course. Any combination of the ten units may be used in any sequence. Schools need purchase only those units desired if they so wish.

The ten units which make up "Industrial Arts: Beginning Electricity — Electronics, Model 30" are:

Unit 1: "The Electric Circuit"
Unit 2: "Electricity and Magnetism"
Unit 3: "Direct Current Circuitry"
Unit 4: "Chemistry and Electricity"
Unit 5: "Motors and Generators"
Unit 6: "Alternating Current"
Unit 7: "Home Wiring and Electric Circuits"
Unit 8: "Automotive Electricity"
Unit 9: "Alternating Current Circuitry"
Unit 10: "Electricity and Communications"

The ten units comprising the course are designed in keeping with modern curriculum practice and make for ease in determining more accurately the materials needed to accomplish objectives for a course or unit of instruction.

When a pupil has learned electricity he has new knowledge, understanding, concepts and ideas which the curriculum maker considers important for a particular course. In addition to this he has a certain degree of skill in putting these understandings to use in solving problems. Both of these, when learned in an environment of meaningful experiences with electrical tools, materials and equipment, can result in maximum learning.

An adequate Industrial Arts Shop Class Period for Junior or Senior High School would be 55 minutes, alloted as follows:

1. Class Routine — 5 minutes
2. Dramatic Demonstration — Class Discussion — Technical Information — about 15 minutes
3. Experiments — Projects — Circuit Tracing — Other Activities — About 30 Minutes
4. Clean-up Duties — 5 Minutes

AUTHOR OF NEW COURSE

William A. Kavanaugh, B.S., M.S., Ph.D., Assistant Professor of Electricity — Radio Electronics, University of Minnesota. Dr. Kavanaugh's education in the field of Electricity, Radar, Electronics and related sciences has spanned nearly a quarter of a century. He has been a distinguished teacher of high school, college and adult classes for fourteen years. His contributions to the teaching profession have long been admired, and his abilities have earned him nationwide prominence in the Industrial Arts field.

In reflecting upon his newly completed course, Dr. Kavanaugh points out: "The ten units in this course are complete, coordinated packages of teaching materials (not just student manuals and teaching manuals)." He states his prime objectives in preparing the course to have been: a unitized course of instruction, a teacher's manual and guide to instruction, coordinated teacher demonstration equipment, pupil job and activity materials and equipment and pupil job and activity work sheets.

Our forthcoming new course fills all these objectives and provides numerous time-saving benefits for the Industrial Arts Instructor: Teacher's shop progress chart, pupil self-testing and evaluation, comprehensive objective final examination and teacher's source of materials.

The course is a first in the application of basic principles in jobs and experiments common to secondary school pupils. It clearly explains basic principles. It coordinates the principles and experiments to common textbooks. Illustrations are given to motivate reading. A safety unit is included in each unit.

To facilitate "preparation time" and relieve instructor's task, our new course provides both pupil and teacher work equipment and materials individually packaged. Expendable materials are easily replaced while non-expendable materials are produced of adequate quality for use again and again.

Something of an unfortunate (but understandable) "stand off" exists in some communities. When we surveyed teaching material purchasing habits, some school buyers were hesitant to buy Industrial Arts courses and materials without knowledge of teacher's opinions. At the same time, some teachers seemed hesitant to request the buyer's requisition of materials due to not knowing his attitude toward various suppliers and material costs.

Our new course, "Industrial Arts: Beginning Electricity-Electronics, Model 30" is the first flexible plan of purchase and use. Each unit is complete within itself. Units may be combined for various length courses. Both teacher and pupil materials for each course are complete within each unit. All ten units are adaptable for short courses or those of one-semester duration. Project plans are suggested for optional use by the teacher. Units can easily be adapted to either the unit or to general shop plan teaching. The forthcoming course satisfies all established state's curriculum requirements for the courses in question.

Universal Scientific Co. is presently completing the final engineering of the equipment for Dr. Kavanaugh's course. The finished course will not be available until January, 1959. Avid interest from those involved in our surveys continues to press us to completion of this most worthwhile endeavor and we welcome the inquiries and expressions of interest from everyone in the expansive Industrial Arts field.

Correspondence may be directed to: Howard Meuche, President, Universal Scientific Co., Box 336 1A, Vincennes, Indiana.

Advertisement

SALARY SCHEDULING

(Continued from page 24A)

the state, and the government place on education.

5. What are the other occupations in the community or county or state, for which the young men and women who become teachers might have prepared themselves?

6. What is the relative value to society of these other occupations? What in relation to these, should be the incomes of teachers?

7. To what extent is it desirable for teachers' salaries to conform to the general level of local incomes and living habits?

8. To what extent is it desirable for teachers to have incomes adequate to satisfy professional tastes and interests, regardless of local standards of living?

No one knows just how teachers' earnings should compare to the earnings of the average employed person in the United States. It would seem, however, that several arguments might justify a much higher income in teaching than is found in many other occupations. First, the importance of the teachers' task to the welfare and progress of a nation cannot be estimated. Second, teaching of superior quality requires a rare combination of native intelligence, professional education, skill in human relationships, patience, and sympathy. The supply of people with these qualifications is likely always to be less than the demand. One of the miracles of America is that it secures as much competence as it does for the salaries it offers teachers. Third, in the effort to secure competence in teaching, professional requirements for professional training have been raised to such a level that preparation for teaching represents a substantial investment in time and money.

Increment

To be called a salary schedule, the salary policy must provide some systematic plan of increments by which the teacher advances from the minimum to the maximum of the salary class. The annual increment should be given careful consideration.

A salary schedule should attempt to reward merit and it cannot be made to work automatically. The increment should be generous enough to keep the teacher satisfied and to serve as an incentive to further professional training. Any schedule which gives the salary awards according to a hard and fast formula cannot escape paying a large percentage of teachers too highly nor can it avoid cheating large percentages.

Most salary schedules today give salary awards wholly on the basis of college preparation and experience. These schedules are often called merit schedules by their authors, but they definitely are not merit schedules.

Requisite to the operation of a merit type of salary schedule is a plan for the rating of teachers; most school systems which use such a schedule rate teachers twice a year according to the following categories: A, excellent; B, superior; C, good; D, fair; E, poor. The annual increments usually provided for the various categories are the following: A, $200; B, $150; C, $100; teachers rated D or E usually receive no increment. Such withholding of increment is essentially a warning of dismissal; the added year without an increment is a period of grace in which the teacher has a further opportunity to demonstrate, if possible, his competence.

Super-Level Salaries

During recent years a few school systems have adopted salary schedules which provide extra compensation for teachers, principals, and supervisors who give outstanding service. To receive them evidence of superior service must be presented.

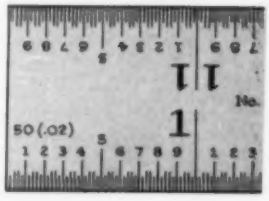
A single-salary schedule is simply one which gives equal pay for equal qualifi-

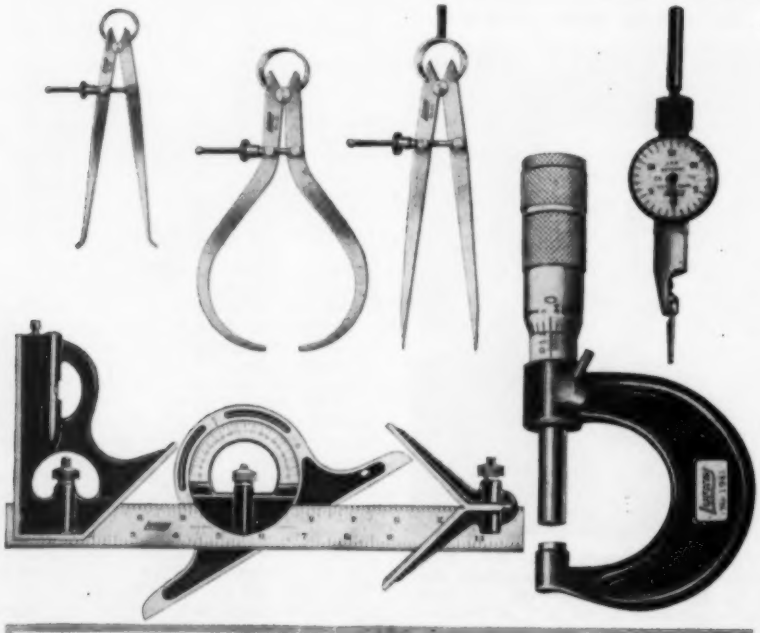
(Continued on page 28A)

LUFKIN precision tools stand up under rugged student use

Lufkin precision tools have built-in durability . . . help cut your costs. Yet provide utmost accuracy and convenience to help students do faster, better work.

Specify Lufkin precision tools for your school shop. Write today for your complete Lufkin catalog. The Lufkin Rule Co., Saginaw, Mich.





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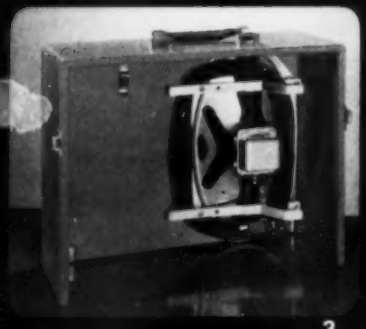
16mm Sound Projector, Model AV-085

1

2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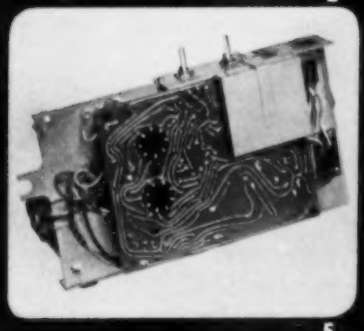
5

6

7 8

When you select a sound projector, demand *more* than just a machine for showing movies. Use as your standard the new Kodak Pageant, Model AV-085, at just $439.*

1. **Easy setups**—No muss or fuss for you (or your students). Film path is printed on projector. Reel arms fold into place; drive belts are permanently attached. You're sure every show will be off to a good start.
2. **Image brightness**—Don't settle for washed-out pictures, even in hard-to-darken rooms. Get the sparkle and details that the Pageant's Super-40 Shutter provides—40% more light than an ordinary shutter at sound speed.
3. **Full range sound**—A speaker must be baffled to make the low tones fully audible throughout the room. The Pageant's NEW, compact 11 x 6-inch oval is *baffled* in an attractive case that forms the cover for your projector.
4. **Permanent lubrication**—The most common cause of projector failures is improper oiling. You never have this difficulty with a lubricated-for-life Pageant. It's always ready to go when you are!
5. **Rugged and compact**—Printed circuits in the new 8-watt amplifier are rugged, help make this unit compact and easy to service. You can easily move it from room to room, set up to show almost anywhere.
6. **Fidelity control**—This feature is important because a sound track can be on *either* side of a film. Only with a focusing control like the one on the new Pageant can you get the optimum sound, *no matter* which side the track is on.
7. **Protection against wear**—The pulldown claw moves the film 28,800 times during a single showing of a 20-minute movie. A tungsten carbide tooth on the new Pageant makes this part virtually wearproof.
8. **Grounded power cord**—New 3-wire cord (complete with adapter for 2-wire outlets) meets electrical codes in all locales.

This exceptionally fine projector is only $439. Ask a nearby Kodak Audio-Visual Dealer to demonstrate the AV-085. Or, write for new Pageant booklet giving all the facts.

**List price subject to change without notice.*

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TRADE MARK

EASTMAN KODAK COMPANY, Dept. 8-V, Rochester 4, N. Y.

Fibre-glass makes this A.C. welder

SHOCKPROOF! NOISELESS!

IDEAL FOR CLASSROOMS... SAFE—SILENT

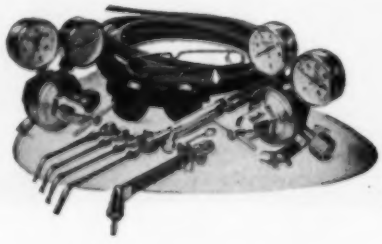
Marquette's new 90 Series Welder is best for classrooms because it is shockproof, noiseless and makes arc striking easier. Why? The welder is enclosed in tough, durable fibre-glass which is *non-conductive!* The "Perma-Shield" cabinet eliminates eddy current losses, noisy vibrations and shock-danger. This new welder is ten per cent more efficient and provides improved arc striking characteristics . . . advantages that teachers and students alike will welcome.

That's not all! The fibre-glass cabinet is rustproof, colorproof, waterproof and moisture proof. It's stronger than steel but lighter in weight and practically indestructible. The entire welder is best for training purposes because it's easier to operate (heat taps are clearly marked and safe, positive and easy to select), it's built to last longer and it will always keep its new appearance.

Two sizes in four models are available. One delivers a maximum of 200 amperes; the other, 275 amperes and each is available capacitor equipped, for increased power factor.

WHAT DOES ANODIZED ALUMINUM MEAN TO WELDING TORCHES?

It's new and Marquette's got it! Oxy-acetylene welding torches made of *anodized aluminum* make them 50 per cent stronger and 50 per cent lighter. Precision made, they're practically unbreakable and will stand years of rough handling. Makes them perfect for training schools. Eliminates factory service because they're equipped with fast change O-ring seals. Simply replace worn seals with new ones and the torch is ready for action in minutes time. Three models (Aero-Jet, Star-Jet and Super-Jet) are available for welding and cutting all thicknesses of metal.



WHAT KIND OF ROD DO YOU WANT?

Marquette makes a welding electrode or gas rod for every welding application. From its famous No. 130 Red Rod for getting deep penetration in dirty, rusty metal to its No. 15 Presto-Arc rod for high speed welding of sheet metal, Marquette offers the best for any shop. This range of rods includes high tensile, hard surfacing, cast iron, special alloys and bronze rods.

WRITE FOR THESE *FREE* FACT-PACKED BULLETINS

1 The 90 Series Arc Welder
2 Jet Series Welding Torches
3 Guide to Better Welding

When it Comes to Welding Come to

MARQUETTE
WELDING EQUIPMENT

Marquette Manufacturing Company, Inc., 307 East Hennepin Avenue
Dept. B-109, Minneapolis 14, Minnesota

SALARY SCHEDULING

(Continued from page 26A)

cations and equal service. It has been designed primarily for the purpose of securing better qualified teachers for the elementary schools and for rewarding them more adequately. The single-salary schedule also pays women teachers the same amount as men teachers, providing their qualifications are equal.

Persons who affirm that men teachers should be paid more generally present the argument that men have dependents whereas women do not. Women teachers frequently have dependents the same as men teachers. There are many men teachers without dependents just as there are women teachers without dependents. It is impossible, therefore, to see the justice of paying all members of a group an additional salary because the majority, as a few, of the members of the group happen to have dependents.

Dependency Allowance

If an additional salary is to be paid for dependents, it is just that it should be paid only to those who really have them. The principle, if placed into operation, should be applied to women and men alike.

There are many arguments against dependency provisions in the salary schedule. However there are many things to be said in its defense. It is generally accepted by teachers as profitable, and serves to keep in the profession young married men who might otherwise seek employment during out-of-school hours or leave the profession.

Cost of Living Adjustments

When prices go up a fixed salary loses in value; when prices go down one can buy more without a salary increase.

Some kind of adjustment to meet changes in price levels seems to be inevitable. This adjustment may be made (*a*) by changing the basic salary schedule when increases or decreases occur in the price level; or (*b*) by providing a continuing policy of adding to or subtracting from the basic schedule an amount that varies from year to year depending on fluctuation of the price index. Both types of adjustments can be made simultaneously. Major changes in the salary scale at intervals of several years, and annual adjustments in terms of the price index — and with many variations of the basic types.

Conclusion

"The teacher is the school" is a time worn truism. Although there are many exceptions to the rule, it is usually true that the higher the salary the better the qualifications of the person who received the salary.

A sufficiently high salary is necessary to attract the best young people into the teaching profession. "The joy of service" is not a sufficient magnet.

A well-qualified teacher in every classroom should be a slogan of the promoter of good schools. Qualified teachers at almost any price are an excellent investment for a community. Such teachers are expensive, but ignorance among a people is much more expensive.

PERSONAL NEWS

(Continued from page 6A)

training institutions developed by the Ministry of Education in the past few years in the improvement of curriculum, shop organization

Dr. William J. Micheels

and management, and staff improvement and development by means of seminars and teacher-training conferences.

Dr. Micheels' departure date was August 31, 1958.

DEPARTMENT HEADS AND FACULTY MEMBERS

President John T. Rettaliata, Illinois Institute of Technology, Chicago, Ill., has announced changes in personnel, effective September 1, 1958.

Dr. Frank D. Carvin, director of the department of mechanical engineering; Cecil R. Glaves, associate professor of accounting; Ludwig K. Hilberseimer, director of the department of city planning; Ludwig Mies van der Rohe, director of the department of architecture; and Mrs. Marie W. Spencer, assistant professor of economics, are retiring.

Dr. Andrew A. Fejer has been appointed director of the department of mechanical engineering, and will succeed retiring director Dr. Frank D. Carvin.

A visiting associate professor and three assistant professors have been added to the faculty. They are Dr. Louis A. Kokoris, mathematics; John W. Emerson, art education division of the Institute of Design; Dr. Sidney A. Guralnick, civil engineering; and Dr. Isadore Hauser, physics.

Advanced to the rank of full professor are Dr. Paul Gordon, metallurgical engineering; and Dr. Stothe P. Kezios, mechanical engineering.

Elected to the Faculty Council are: Miss Mollie Cohen, assistant professor of English; Dr. Fred Kisslinger, associate professor of

(Continued on next page)

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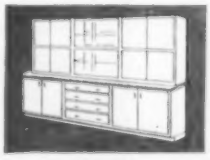
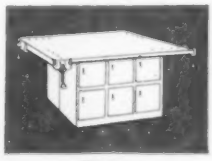
Never before have wood, steel and color been so imaginatively combined! New Hamilton Arts and Crafts furniture unites contemporary design and modern materials with Hamilton's years of experience in the school equipment field. The result—the most attractive, economical and highly functional Arts and Crafts line available. Why not see for yourself . . . consult your Hamilton representative for creative planning help!

Hamilton furniture makes teaching more productive—learning more enjoyable!



Storage

Mechanical Drawing



Shop

Hamilton

ARTS AND CRAFTS EQUIPMENT

HAMILTON MANUFACTURING COMPANY • TWO RIVERS, WISCONSIN

PERSONAL NEWS

(Continued from page 29A)

metallurgical engineering; Kenneth P. Milbradt, associate professor of civil engineering; and Dr. Lee R. Wilcox, professor of mathematics.

EDUCATOR DIES

Wayne L. Pratt, director of vocational education in the Iowa State Department of Public Instruction, died in May, 1958, after suffering a heart attack.

Mr. Pratt of Des Moines, received a master's degree from Iowa State College and subsequently served as superintendent of schools at several school systems in western states. Later he was superintendent of the Martensdale School for two years.

In 1949 he was appointed to the department of public instruction by Jessie Parker, then superintendent.

JAMES M. O'NEILL RECEIVES APPOINTMENT

James M. O'Neill has been appointed head of the industrial-arts department of the new Baldwin Senior High School, Baldwin, Long Island, N. Y. He is a past president of the Long Island Industrial Arts and Vocational Teachers Association.

During World War II he served as a B-26 bomber pilot in Europe and shortly thereafter received his M.A., from New York University.

Mr. O'Neill has just completed a book for The Bruce Publishing Company entitled *Fabricating With Formica*, which is the first book of its kind in this particular field of industrial arts. He carries on a small business of custom work in the area of home fabrication as described in his book.

News Notes

CAREER MOVIE AVAILABLE

The motion picture, "Printing — A Future Unlimited," produced by the Education Council of the Graphic Arts Industry, Washington, D. C., may be obtained on a free-loan basis from Crown Zellerbach Corporation. Requests for use of the film from east of the Rockies should be addressed:

Printing — A Future Unlimited
Crown Zellerbach Corporation
Regional Printing Paper Division
36 South Wabash Avenue
Chicago 3, Ill.

Requests from west of the Rockies should be addressed to:

Printing — A Future Unlimited
Crown Zellerbach Corporation
Printing Paper Division
343 Sansome Street
San Francisco 19, Calif.

Crown Zellerbach will pay postage to the film's destination and the recipient will be required to pay return postage. Since the number of free-loan copies available is limited, it is suggested that requests for scheduled showings be mailed as early as possible.

"Printing — A Future Unlimited" is the first motion picture to be produced by the graphic arts industry to tell young people about its vocational and career opportunities. In premier showings of this 22-minute, 16mm., color, sound movie in over 20 cities throughout the United States to high school audiences, it was applauded for its technical perfection, interesting story, and understanding of the interests of young people in thinking about their future.

The film was produced by the Education Council of the Graphic Arts Industry with the assistance and advice of a group of educators, guidance counselors, printing teachers, and printers.

INITIATION CEREMONY AND BANQUET HELD

At Southern Illinois University, Carbondale, Ill., the summer session initiation ceremony and banquet of Psi Chapter, Iota Lambda Sigma, was held at the Lodge, Giant City State Park, on July 10, 1958.

After the interrogation of candidates and the initiation ceremony, the banquet was held.

Kenneth Miller, who recently joined the administrative staff of Southern Illinois University, spoke on "Who Put the Textbook in Murphy's Dinnerpail."

Those initiated into Psi Chapter were: Edward Kazarian, Paul Koblitz, Philip Hall, Martin Oliver, George Starasta, Edward Outlaw, and Kenneth White.

SAFETY PAMPHLET — "DON'T BE ALARMED"

The National Safety Council has published an accordion-fold pamphlet, "Don't Be Alarmed," giving the latest information and advice about fires.

Fire, the multi-colored pamphlet points out, is one of industry's deadliest foes. Each year, fire costs industry countless thousands of dollars. It takes thousands of lives.

The common and uncommon causes of fire are presented in "Don't Be Alarmed" in an easy-to-read, hard-to-forget manner.

Further information and quantity prices may be obtained from the *National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.*

ANNUAL READING CLINIC

The next Annual Reading Institute at Temple University will be held in Philadelphia, Pa., January 26 through January 30, 1959, inclusive.

The theme will be "Instructional Approaches in Reading."

Meetings are to be held for kindergarten, primary, and intermediate teachers; junior and senior high school teachers; reading and language arts teachers; school psychologists; special class directors and teachers; administrators and supervisors; teacher education personnel; college reading directors and instructors; and reading clinic directors and clinicians.

Typical Institute activities include demonstrations on procedures and techniques; laboratory practice; small group discussions and question periods; workshops; lectures; panel discussions; staff meetings; and conferences with staff members.

Advance registration is required. For information write to *The Reading Clinic, Department of Psychology, Temple University, Philadelphia 22, Pa.*

DEPARTMENT OF PRODUCT DESIGN

Final plans for the establishment of a new Department of Product Design in the School of Design at North Carolina State College, Raleigh, effective September 1, 1958, were announced by Dean Henry L. Kamphoefner.

Austin R. Baer heads the department. He is president of Idea Technology, Inc., New York City, a consulting firm in product design.

The principal objective of the new department will be to train students to design industrial products. Through its work, the department will attempt to improve the appearance of the State's manufactured products in local, national, and world markets.

(Continued on page 32A)

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Vacuum Tube Voltmeter DYNAMIC DEMONSTRATOR ONLY $10.00
Simulates EICO #221 VTVM in all its functions and ranges. Helps you teach the use and reading of the VTVM with giant 13" meter scale. 14¾" wide x 23" high x 3½" deep. Easily viewed by the complete class. Punched holes for easy hanging. Steel cabinet, aluminum panel.
EICO KITS are top-quality professional TV/radio/electronic test instruments, hi-fi components & amateur radio gear — embody latest performance-proven design and circuitry. Complete with all parts, pre-punched chassis, deep-etched aluminum panel, rugged steel case — plus pictorial diagrams; schematics; data on color codes, soldering, tools. "Beginner-Tested" step-by-step instructions help the student learn by "doing it himself" — quicken his familiarity with the construction, operation and maintenance of electronic equipment. Used by leading vocational schools, colleges & universities throughout the U.S. and the world. Over 1 million sold to date. LIFETIME service & calibration guarantee at nominal cost.
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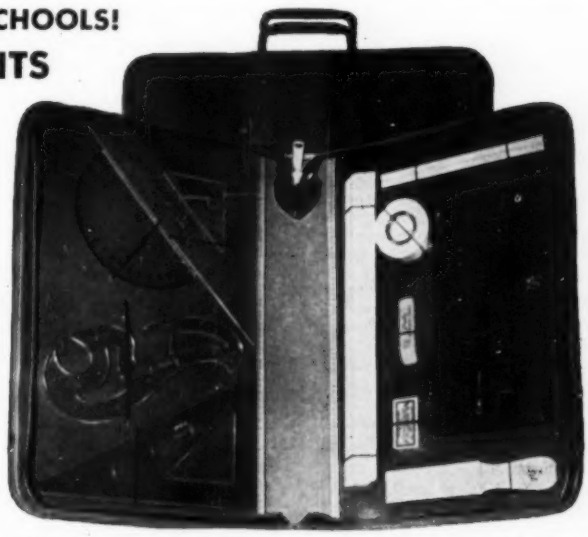

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Berger Drawing Set #510 plus complete kit: $10.50

All in attractive, durable, 12" x 16" 3-way zipper carrying case of scuff-proof, waterproof Texon with slide-in handles. Inner compartments for papers. Opens to 16" x 24".

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New Economy Size Porta-Draft Kits From $5.58

Choice of Drawing Sets . . . PLUS

Protractor	French Curve
12" Triangular Scale	Pencil Pointer
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In handy 10" x 14" zipper carrying case of Texon. Two inner compartments for note papers. Opens to 14" x 20".

Prices quoted are for 6 or more kits. Instructors may buy sample kit at same low price.

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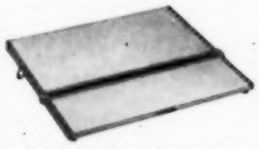

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This hand-polished precision engineered All-Angle Drawing Stand will suit all your working needs. It tilts, swivels and locks quickly in any desired position. Has positive-action gear-type serrated locking surfaces. Rigidly made of lightweight aluminum alloy and steel parts. Non-slip rubber-tipped legs protect any working surface. (Screws included for mounting to your board). Board not included.

- Lightweight, easy to carry or store.
- Mounts to your board in minutes. Makes an unusual, thoughtful gift.

FLOOR MODEL #714 — adjusts for sitting or standing (raises or lowers). Folds flat for storage in seconds. **$14.95**

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(Continued from page 30A)

The 1957 General Assembly appropriated $36,000 for the creation of the department and for the employment of a top-ranking designer to head the new academic unit.

A comprehensive five-year course of study for the degree of Bachelor of Product Design will be inaugurated with the fall school term.

Working in collaboration with engineering and the assembly-line process, graduates of the new course will design furniture, textiles, ceramics, utensils, appliances, automobiles, and the packaging of industrial and agricultural products.

When N. C. State rounds out its first year with the industrial design course, the budget provides for the appointment of a second faculty member, beginning in September, 1959.

N. C. State is the second institution of higher learning in the Southeast to enter the industrial design field. Georgia Tech has previously set up a department. Other leading departments have been created at the Rhode Island School of Design, Pratt Institute in New York, and Syracuse University.

ILLINOIS INSTITUTE OF TECHNOLOGY

A $1,200,000 addition to the metals-research building at Armour Research Foundation of Illinois Institute of Technology will be dedicated on Monday, October 20, 1958, at Chicago.

The event will mark the completion of the second step in a 10-year expansion program announced by the Foundation early in 1956.

The four-story addition, on the north end of the building at 3350 S. Federal St., will more than double the amount of previously available space for metals projects, giving the department a total of 68,000 square feet of working space.

The four floors of the addition will provide space for research sections of electrochemistry, and applied, powder, reactor, physical, and nonferrous metallurgy, as well as new reception and administrative offices for the department.

Designed by internationally known architect Ludwig Mies van der Rohe, retiring director of the Illinois Tech department of architecture, the structure is the first addition to a new building on the IIT campus.

The original metals building was Mies's first building in the United States and the first building to be erected on the modern IIT campus. It was constructed in 1942 to house metals research on war projects.

* * * * *

A $21,000 grant awarded to Illinois Institute of Technology, Chicago, may aid in the proper handling of known explosives and lead to the development of new ones.

The one-year U. S. Army Bureau of Ordnance grant for basic research on "Crystal Studies of Explosives" will be under the direction of Dr. Leonid V. Azaroff, associate professor of metallurgical engineering.

* * * * *

Creative trends in urban building will be the theme of the fourth annual National Construction Industry Conference to be held in the Sherman Hotel, at Chicago, on December 10 and 11, 1958.

Sponsors of the conference are Armour Research Foundation of Illinois Institute of Technology, American Institute of Architects, American Society of Civil Engineers, Associated General Contractors of America, and the Building Research Institute.

Inquiries concerning the conference should be addressed to *Conference Chairman R. T. Mijanovich, Armour Research Foundation, 10 W. 35th St., Chicago 16, Ill.*

NEW EDITION OF "ACCIDENT FACTS"

The 1958 edition of "Accident Facts," the National Safety Council's statistical yearbook, is now available.

It contains facts and figures on all types of accidents — industrial, traffic, motor transportation, home, farm, and school.

According to the Council, the 96-page book provides ideas and facts for making speeches, writing articles, preparing reports, and planning safety campaigns.

Further information on "Accident Facts" and quantity prices may be obtained from the *National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.*

LASALLE EXTENSION UNIVERSITY MAKES PURCHASE

E. J. Kendall, president of LaSalle Extension University announced recently that the board of directors approved the purchase of the Stenotype School of Chicago.

Classes began in the LaSalle Extension University Building, 417 South Dearborn, effective September 2, 1958.

LaSalle also recently acquired the Bryant and Stratton College. The Stenotype School represents the second resident school acquired by LaSalle during its fiftieth anniversary year.

New Publications

Adhesives and Sealants in Building

Paper, 160 pp., 8½ by 11 in., illus., $5. This is a research correlation conference that was

(Continued on page 34A)

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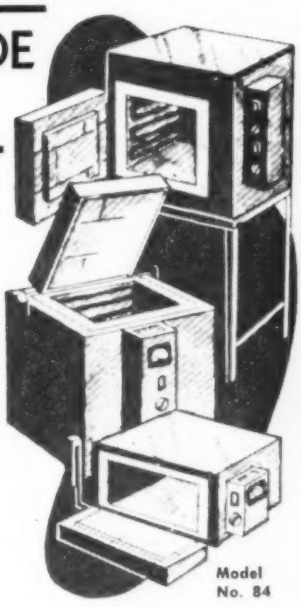
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CRAFTKILNS beautifully finished in a green Hammer-tone, heat-resistant paint. They are available in five types to suit every ceramic need. Front Loaders, in both STANDARD and HI-FIRE models. Top loaders, in both STANDARD and HI-FIRE models, and METAL ENAMELING KILNS. Stewart will also build kilns to your specifications. Please write for complete information on custom kiln construction.

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New spade type electric drill. Does more work with less power — steps up the efficiency of small ¼" electric drills and drill presses. Exclusive hollow ground point bores cleaner, faster in hard and soft woods, plywood, plaster, plastics. No wobble or run off. Size markings on head. Hang-A-Bit hole for storing on nail or pin. Sizes ¼" to 1½" and sets.

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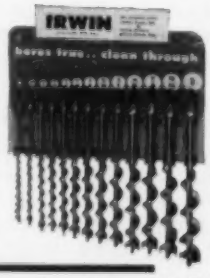
America's most popular School Shop set. 13 Irwin 62T hand brace type bits in hand-rubbed hardwood box, sizes ¼" to 1". Medium fast screw pitch makes the Irwin 62T ideal for all-purpose boring in most any wood. Double cutter action, solid center design, hardened full length for longer life. Each bit highly polished. Also available in individual sizes and plastic roll sets.

D-13 SCHOOL SHOP SPECIAL
Irwin storage rack and bit set. A convenient combination of 13 Irwin 62T wood auger bits and small space storage rack. Patented spring steel clips hold bits in place. Hole sizes make selection sure and easy. Steel rack fits 8" x 10¼" area and screws easily to wall or bench. Boring range of 13 bits, ¼" to 1".

Write for Free Irwin Catalog No. 52. Makes ideal reference guide.



IRWIN Wilmington, Ohio

the original solid center auger bit
•
screw drivers
screw driver bits

NEW PUBLICATIONS

(Continued from page 32A)

conducted by the Building Research Institute. It is their Publication 577.

In it are discussed adhesives, sealing compounds and tapes, preformed gasketing materials and tapes, and pressure-sensitive tapes.

Sealing joints in the building exterior-traditional methods, and calking metal curtain walls are discussed; also adhesives for building interiors, for structural materials and compounds, and the future of adhesives and sealants in building.

Understanding Your Car — How It Works — How to Maintain It — How to Inspect It

By Samuel C. Beeler. Paper, 128 pp., 7¾ by 10¼ in., illus., $1.60. McKnight & McKnight Publishing Co., Bloomington, Ill.

This is an interesting and useful text which presents 24 very practical jobs, and 39 topics for study and discussion.

Part I of the book discusses the body and the chassis of the automobile.

Part II presents topics 3, 4, 5, and 6 on automobile finishes, body lubrication, and upholstery materials. Also jobs 1 to 3.

Part III devotes topics 7 to 16 and jobs 4 to 10 on the power plant; topics 17 to 21 and jobs 11 to 15 on the running gear; topics 22 to 27 and jobs 16 to 18 on the drive system; topics 28 to 30 and jobs 19 and 20 on the control system; topics 31 to 33 and jobs 21 to 24 on the electrical system.

Part IV covers general information with topics 34 to 38.

The Accreditation of Industrial Arts Teacher Education

By Verne C. Fryklund and H. L. Helton. Cloth, 111 pp., 6⅛ by 9¼ in. American Council on Industrial Arts Teacher Education, Boston, Mass.

This is the seventh yearbook — 1958 — of the American Council on Industrial-Arts Teacher Education. The book is a condensed report of a seven-year national study relating to the subject of accreditation of industrial-arts education.

The six chapters of the book present the material under the following headings: purposes and procedures in accreditation, history of accreditation, conduct of the national survey, the evaluative instrument, supplementary guide for industrial-arts teacher education, role of industrial-arts education in self-improvement.

The Golden Number and the Scientific Aesthetics of Architecture

By M. Borissavlievitch. Cloth, 91 pp., 5⅜ by 7⅜ in., illus., $4.75. Philosophical Library, New York, N. Y.

This booklet describes the difference between the aesthetic world and the mathematical world, presents critical comments on the mathematical method in investigating aesthetic phenomena, and presents the views of the scientific aesthetics of architecture and the golden number.

The author presents and discusses compositions based on the golden number, and presents the laws of architectural harmony.

A Handbook of Drafting Rules and Principles

By Howard C. Nelson. Paper, 96 pp., 5½ by 8½ in., illus., $2. McKnight & McKnight Publishing Co., Bloomington, Ill.

The author of this book is an instructor of engineering drawing at the University of Illinois. He has produced a very fine book which

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Make Your Own Plastic Tool Handles with TENITE II
SCREW DRIVER HANDLE STOCK
Makes tough, durable handles for screw drivers, trowels, plastic gavels, chisels, mallet heads and hand drills. The finest material made for any application that must withstand shock and abuse. Available in two styles: Fluted round type, ½" thru 1¼" dia.; smooth round, 1", 1¼" and 1½" dia. Amber transparent color, only.

HOW TO MAKE BOWLS OUT OF FIBERGLAS CLOTH — POLYESTER RESIN
It's easy, fascinating work. Calls for inexpensive equipment. Students can make bowls of different shapes and sizes using remnants of drapery material, dress goods, even burlap, for decorative effects. Free literature gives instructions and prices.

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We have them 0.002" and thicker. Vinyl in rolls up to 6 ft. wide; Polyethylene up to 40 ft. wide. Also make a perfect moisture barrier and mulch on strawberry plant and flower beds.

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1157 S. Kingshighway Blvd., St. Louis 10, Mo.

will be found useful by the beginner who is studying the subject of drafting, and also by the practical draftsman as a reference book.

The book contains 7 chapters which give clear explanations about the use of the drawing instruments, the different kinds of lines, the proper use of dimensions, lettering, how to ink in drawings, and how to make mechanical and pictorial drawings.

Abstracts of Dissertations in Education

Accepted by The University of Missouri from 1955 through 1957. Paper, 98 pp., 6 by 9 in.

This bulletin was prepared under the direction of Dr. A. G. Capps. It contains abstracts of 52 doctoral dissertations accepted by the University of Missouri for the June and August commencements of 1956 and 1957.

Six of these bulletins have been issued up to now. They contain the abstracts of 382 doctoral dissertations in Education and represent a period of more than 40 years.

Industrial Control Circuits

By Sidney Platt. Paper, 194 pp., 5½ by 8½ in., illus., $3.90. John F. Rider Publisher, Inc., New York 11, N. Y.

A fundamental knowledge of electronics is all that is required to gain complete familiarity with the basics of industrial control circuits. The author looks at the subject through the eyes of a person with little or no knowledge of this field, explaining the circuits that govern the initiation, processing and finishing stages of industrial electronic equipment in a straightforward, easy-to-understand manner. Specific industrial applications are used to graphically describe the problems of industrial control. Every phase of control circuits is discussed including electronic relay control and timing circuits, photoelectric control, power controls and industrial control instrumentation.

Electrostatics

Edited by Dr. Alexander Schure. Paper, 72 pp., 5½ by 8½ in., illus., $1.35. John F. Rider Publisher, Inc., New York 11, N. Y.

Basic to understanding electric current is a firm knowledge of electric charges and electric fields. This book covers a lot of ground in explaining one of the cornerstones of electricity.

The volume considers fundamental physical units and quantities preparatory to the study of Coulomb's Law, Gauss's Law, and others. The electric field is covered both quantitatively and qualitatively making liberal use of worked out examples. The cgs and mks unit systems are explained; capacitance and capacitors are analyzed.

A final chapter is devoted to electrostatic applications. This is an excellent explanation of the basic area of electronics. It will benefit anyone entering or already in the fields of electricity and electronics.

Calculus for Electronics

By A. E. Richmond. Cloth, 407 pp., 6¼ by 9¼ in., illus., $6. McGraw-Hill Book Co., Inc., New York, N. Y.

This instructive text describes the practical application of calculus in the study of electrical circuits.

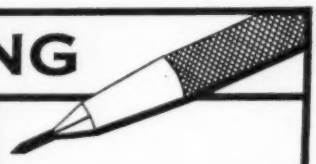
Students of this book should be acquainted with the fundamentals of algebra and trigonometry and know how to use logarithms and complex numbers before attempting to take up the study of calculus.

The book explains the fundamental concepts and basic operations of calculus; also additional functions, further operations, infinite series, and differential equations.

It also contains tables of trigonometric identities, natural and common logarithms, exponential functions, and hyperbolic functions.

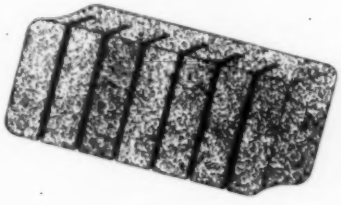
(Continued on next page)

DRAFTING TIPS



"Do it yourself" pencil cleaner

A block of felt such as an old blackboard eraser with a series of parallel grooves in the face has proved to be very efficient for removing graphite

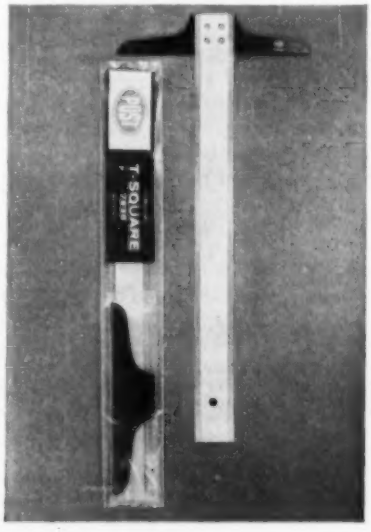


dust from pencil points after sharpening. Pencil point is simply run through one of the grooves after sharpening.

New "TRU-UP" T-SQUARE Eliminates Alignment Problems

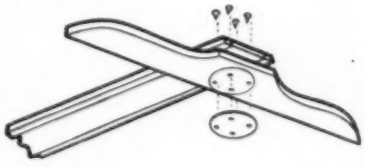
Many of our friends who are industrial arts teachers are particularly enthusiastic in their reception of the latest addition to POST's complete selection of T-Squares.

The new entrant called the "Tru-Up" is basically a high quality 24" maple T-Square Blade with transparent edges. Complete with ebonized head, and key-end construction, it includes the fine finish and precise, quality construction that users have come to expect on any item bearing the "POST" mark.



But, unlike other T-Squares the Tru-Up comes with the head dismounted, in a compact rectangular package about 24½" long. The special patented construction, illustrated in the diagram below, permits the square to be quickly assembled by simply tightening four brass screws.

The handling advantages are obvious. T-Squares become easy to store or to carry to and from class. For both instructor and student the new Tru-Up produces an extra bonus of convenience.



But, even more important, Tru-Up special construction provides protection against rough handling, or even horseplay. If it is knocked out of alignment through abuse, Tru-Up can be readjusted and tightened to perfect squareness.

Tru-Up No. 7838 is so new it is not covered in your existing POST catalog. For complete information on this convenient new drafting tool *write to Educational Sales Division, Frederick Post Company, 3648 North Avondale Ave., Chicago 18, Illinois.*

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NEW PUBLICATIONS

(Continued from previous page)

Motor Service's Automotive Encyclopedia

Edited by Jud Purvis and William K. Toboldt. Cloth, 756 pp., 6⅝ by 9⅜ in., illus., $7.95. The Goodheart-Willcox Co., Inc., Chicago, Ill.

This is the second revised edition of this voluminous text on the automobile. It teaches fundamental principles of operation, and basic service procedures.

Included also are mechanical and tune-up specifications on American passenger cars for the past 25 years.

Information and service specifications on over 100 English, French, German, Italian, Swedish, and Australian models also are included, as are also tractors, trucks, motorcycles, Diesel engines, and small engines.

Vocational and Professional Monographs

Bulletin No. 11 — "Agriculture" by E. V. Walton and Jarrell D. Gray.

Bulletin No. 36 — "The Fine and Applied Arts" by Royal Bailey Farnum.

Bulletin No. 83 — "The Dairy Industry" by H. F. Judkins.

Bulletin No. 95 — "The Poultry Industry" by A. William Jasper.

Bulletin No. 98 — "The Scientific Instrument Industry" by James R. Irving.

This is a series of monographs in the Vocational and Professional Monograph Series. These monographs are used in connection with guidance activities wherever general counseling work is conducted and for individual reference purposes in the choice of a career.

Each pamphlet includes material on: history of the occupation or industry; qualifications for employment, training required, methods of entry, opportunities for advancement, earnings, general trends in the occupation or industry, and sources of further information.

These monographs retail for $1 per copy.

How to Win a College Scholarship

By David R. Turner and Harry A. Tarr. Paper cover, 7¾ by 10⅛ in., $3; cloth, $5. Arco Publishing Co., New York, N. Y.

Thousands of college scholarships go begging every year for lack of applicants. Yet competition for scholarships is getting more intense.

This book provides considerable help and guidance in this much discussed area. It is concise and well organized and gives the answers to many questions which parents, students, and teachers are daily called upon to answer. It contains 572 pages of up-to-the-minute information on the thousands of scholarships now available, together with drill material and down-to-earth help for the seeker after information on "How to Win a College Scholarship."

Experimental Basic Electronics

By Rupert N. Evans and Charles B. Porter. Cloth, 104 pp., 7 by 10¼ in., illus., $3. McKnight & McKnight Publishing Co., Bloomington, Ill.

This text has been used in mimeographed form in junior and senior high school classes, and has been twice revised before it was published in the present book form. An experimental kit can be purchased to go with this course.

The book contains 6 basic experiments and 12 advanced experiments.

(Continued on page 38A)

Cut shop outfitting costs with rugged, functional, attractive Hallowell Woodworking Benches

MODEL 1000-C-RWX. 4-position bench with cabinet base. Tops: 64 x 54 x 2¼ in. or 64 x 60 x 2¼ in.; nominal working height: 33¾ in.

MODEL 1005-C-RWX. 1- or 2-position bench with cabinet base. Tops: 64 x 24 x 2¼ in., 64 x 30 x 2¼ in. or 64 x 36 x 2¼ in.; nominal working height: 33¾ in.

Standard HALLOWELL Woodworking Benches, specially designed for school shops, have the qualities of custom-built equipment, yet are much less expensive. And the savings do not stop with the initial cost—rugged construction assures years of troublefree service.

There are other advantages, too. The functional design of these benches is similar to that used throughout industry. Students become accustomed to working on equipment that has been an industrial standard for years. The benches are attractive, look well in any environment. Even the smallest shop can have that pleasant, uncluttered appearance.

Our bulletin Form 2246 gives full information on all units in the HALLOWELL line of school shop furniture. Write for your copy today. Columbia-Hallowell Division, STANDARD PRESSED STEEL CO., Jenkintown 74, Pa.

SPECIFICATIONS

Tops

SHOPTOP. Made up of a solid core of laminated blocks faced with ¼ or ⅜ in. sheets of kiln-dried wood particles bonded with phenolic resin under heat and pressure. The facings are treated with special RW-77 coating to resist acids, alkalis, oil, grease and abrasion. They can be refinished when required just as you refinish wood.

Bases

Cabinets are of all-welded steel with interlocked deep flange construction. Each is 36 x 21 in. deep, has one adjustable shelf (extra shelves are available). Channel-reinforced doors have 2-point latching device with cylinder locking handles. Two keys are supplied for each lock. Steel angles are provided for firmly mounting top to base and base to floor.

Finish

Tops are treated with a special RW-77 coating to resist acids, alkalis, oil, grease and abrasion. Then they are finished in an attractive natural wood color that enhances the visibility of objects. The facings can be refinished like wood as required. Bases are phosphate coated, then finished in SPS green baked-on enamel. Other colors are available at extra cost.

Accessories

Bench dogs and adjustable bench stops are optional at extra cost. Additional shelves can be added. All woodworking benches are available with or without vises.

General Information

All cabinets are shipped assembled. Tops and accessories are packaged separate.

HALLOWELL woodworking benches are also available with locker base or open base. All models are described in our bulletin.

SPS **Jenkintown • Pennsylvania**

Standard Pressed Steel Co. • The Cleveland Cap Screw Co. • Columbia Steel Equipment Co. • National Machine Products Co. • Nutt-Shel Co. • SPS Western • Standco Canada Ltd. • Unbrako Socket Screw Co., Ltd.

NEW PUBLICATIONS

(Continued from page 36A)

Teachers' Salaries and Economic Trends

Paper, 28 pp., 80 cents. National Education Association, Washington 6, D. C.

The report shows that teachers' average annual salaries have increased at the rate of about 6 per cent a year for the past ten years. For the year 1957–58, the average annual salary of instructional staff members was estimated at $4,650, or an increase of 6.9 per cent over 1956–57. For the unmarried teacher earning the average salary in 1957, and who claimed no exemptions except one for himself, the salary after federal income tax was $3,736. Sections of the report are devoted to the problems of teachers and collective bargaining, class sizes, credit unions, and teachers and pupils versus the law.

Woods and Woodworking for Industrial Arts

By Delmar W. Olson. Cloth, 235 pp., 6 11/16 by 9½ in., illus., $4. Prentice-Hall, Inc., New York, N. Y.

A simple valuable text for the high school student and the home shop enthusiast who is interested in making furniture and cabinets for the home. It emphasizes contemporary designs, and also gives direction in using hand and power tools.

The book also explains how to use abrasives, adhesives, finishes, and illustrates how to do upholstering.

It contains related information about trees, lumber, and wood adhesives, and shows how mathematics can be used in problems pertaining to woodwork.

It contains a section on how industry makes products of wood, and how the reader can apply his knowledge of woodworking in his home workshop or on *do-it-yourself* projects.

It also has a section on the *consumer and wood products*, and on the design of wood products.

A History of the Milwaukee Vocational and Adult Schools

By Robert W. Tarbell. Cloth, 278 pp., 6¼ by 9¼ in., illus. Composed and printed by the Milwaukee Vocational and Adult Schools Press, Milwaukee, Wis.

The author of this interesting book was well prepared for the job of writing the story of this famous school. He entered the field of vocational education shortly after the vocational school law was passed in Wisconsin. He joined the faculty of the vocational school in Milwaukee in 1914 after a varied experience of several years in industry, and as an instructor in industrial and technical subjects. After some years as instructor of apprentice classes, he was assigned to administrative work in which capacity he continued until he retired several years ago.

Besides describing the originators of the Wisconsin State Law of 1911 and the organization of the Milwaukee school, he presents interesting sketches of R. L. Cooley and Wm. C. Sieker, the original director and principal of the school. He also describes the building of the building which now houses the school, presents sketches of some of the early faculty members, shows what effect some of the economic periods had on the school, and what effect the school and its curriculums had on its complex student body, the method of instruction used in the school and on the community projects undertaken, and the leadership which has been displayed by Dr. Wm. F. Rasche as principal and director since the death of Sieker and Cooley.

Repairing Portable and Clock Radios

By Ben Crisses and David Gnessin. Paper, 128 pp., 5½ by 8½ in., illus., $2.75. John F. Rider Publisher, Inc., New York 11, N. Y.

Anyone looking for a background on troubleshooting and repair of portable and clock radios, will find that the explanations in this book fill his need. The text is primarily concerned with the differences between portable and clock radios, and conventional superheterodynes. An extremely detailed analysis is made of the power supplies, the primary difference, and of switching circuits in a.c./d.c. portable radios. Coverage of the new transistorized units as well as standard tube types is excellent. Mechanical troubles, general troubleshooting, repair and replacements, alignment, and design improvement are all given full and accurate treatment. The discussion of clock radios is also very complete and includes clock mechanisms and their electrical connections, servicing instructions, cleaning and lubrication, and alarm and switch adjustments.

Mechanics

By Dr. Alexander Efron. Paper, 112 pp., 5½ by 8½ in., illus., $1.50. John F. Rider Publisher, Inc., New York 11, N. Y.

This book is part of the Basic Science Series. It is a technically thorough analytical treatment of a basic area of physics that is perfect for study, review, and reference. The initial discussions provide a background in vectors which is then applied to moments and torques; description of kinds of motion pre-

(Continued on page 40A)

FREE teaching aid

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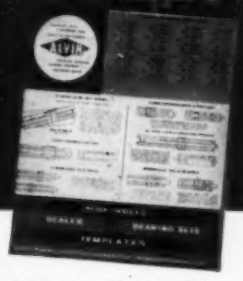

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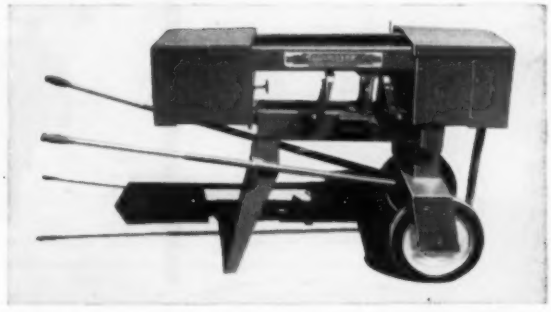

Here's the popular Kalamazoo Model 610 metal-cutting band saw on the handiest chassis you ever saw. Provides greatly increased portability with its rubber-tired 12-inch wheels and telescoping handles. One man shifts the 610 from job to job with ease. Capacity 6" Rounds—10" Flat.

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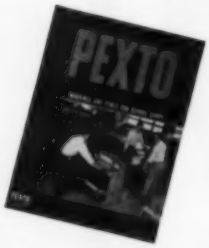
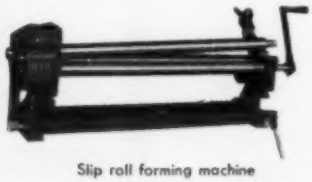
and hand tools . . . the ideal choice for school shops everywhere. PEXTO means dependability and long life performance for the student and the skilled sheet metal craftsman.



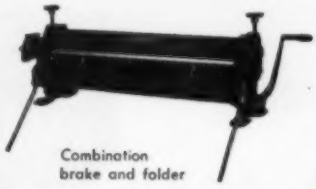
Foot squaring shear

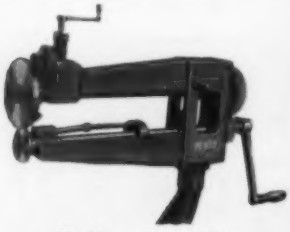
Free to school shop instructors, a valuable School Shop Manual, containing ideas on methods and time-saving aids and an easy reference guide to the selection of school shop sheet metal sheet working equipment. Ask for Bulletin No. S-36.

Ring and circle shear


Slip roll forming machine

Adjustable bar folder


Combination brake and folder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A complete line of machines and tools for Sheet Metal Fabrication.

NEW PUBLICATIONS

(Continued from page 38A)

cedes Newton's Laws of Motion and such topics as energy, work, frictional forces, and mechanical efficiency. This knowledge is then brought to bear on an analysis of such topics as power and work, velocity, horsepower, motor efficiency and water power. Illustrations and model problems, and questions and problems at ends of chapters further aid quick understanding.

Machine Woodworking

By Robert E. Smith. Cloth, 203 pp., 8 by 10⅝ in., illus., $3.60. McKnight & McKnight Publishing Co., Bloomington, Ill.

This is a new edition of an excellent text on machine woodworking. It covers in logical organization and sequence the operation of power woodworking equipment and sharpening of tools. The 356 illustrations, along with concise, readable instructions make this book practical and thorough. It includes new material on the radial saw, portable router, portable shaper, portable electric drill, and portable electric saws.

Home Air Conditioning

By Joseph Derman, Harold Seaman, and Floyd Makstein. Paper, 152 pp., 5½ by 8½ in., illus., $3.50. John F. Rider Publisher, Inc., New York 11, N. Y.

This modern, up-to-the minute text supplies a firm foundation in the theory of air conditioning upon which the practical know-how for installation and repair can be built. Starting with the basic physics of air conditioning, the discussion covers such component parts as compressors, condensers, capillary tubes, and their functions. Typical window and package installations are thoroughly described and illustrated. Small commercial installations are included. Troubleshooting and repair techniques are also discussed. Recent and future developments in air conditioning are covered.

Home Economics — Careers and Homemaking

By Olive A. Hall. Cloth, 301 pp., 6 by 9¼ in., illus., $4.25. John Wiley & Sons, Inc., New York 16, N. Y.

This book serves the dual purpose of preparing the student for personal and home life as well as for a career.

The 12 chapters discuss home economics in higher education; higher education for women; the development of home economics; the vocational goal; homemaking as a profession; the outlook for a teacher; working with children, youth, and families; a home economist in business; opportunities related to clothing and textiles; a future in food service or nutrition education; and the challenge of research; and the future.

Manual of Nutrition

Cloth, 67 pp., 6 by 9$^{9}/_{16}$ in., $3.50. Philosophical Library, New York, N. Y.

This is the fourth edition of a book first published in Great Britain in 1945 when nutrition was a very vital subject to the British people surrounded as they were by an enemy which left nothing undone to deprive them of many types of foods.

The book contains outlines of 12 lectures.

Part I discusses the carbohydrates, fats, proteins, and food consumption for physical work.

Part II takes in inorganic elements and vitamins.

Part III, digestion of foods, absorption of nutrients, composition of foods and recommended nutritional allowances.

Part IV, cooking meals, and planning balanced meals. The appendixes discuss the composition of food, and present a list of recommended books.

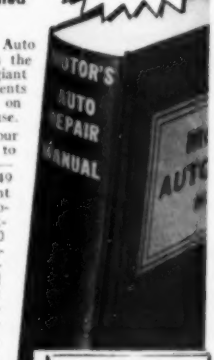
FAMOUS MANUAL SHOWS YOUR STUDENTS STEP-BY-STEP

How to Service or Repair Any Car

the factory-approved way

BRAND-NEW REVISED EDITION!

Contains the "Meat" of 176 Official Shop Manuals In One Big Illustrated Guide



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Here is everything your students need to know to repair over 600 models — every popular make, 1949 thru 1958. 1000 giant pages. 2,900 "how-to-do-it" pictures. 291 Quick-Check Charts. 23,000 essential repair specifications, 225,000 service, repair facts. Illustrated guidance on: Automatic Transmissions, Air Suspensions, Ignitions, Carburetors, Fuel Pumps, Steering Gears, Brakes, Generators, Distributors, Power Brakes, Power Steering, etc., etc. Tune-Up Charts. Tables of Measurements and Clearance, etc. PLUS TROUBLE-SHOOTING SECTION showing how to spot 2,3000 car troubles! Used by U. S. Armed Forces.

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Business and Personal News

BROWN & SHARPE ENLARGE HYDRAULICS DIVISION

The hydraulic pump and fluid motor business of the Gerotor-May Company of Baltimore, Md., will become a part of the Hydraulics Division of the Brown & Sharpe Manufacturing Company of Providence, R. I., as announced recently.

One of the four divisions of Brown & Sharpe, the recently formed Hydraulics Division was established for the purpose of enlarging the company's hydraulic product line.

BLACK & DECKER APPOINTMENTS

Glenn C. Wilhide, Jr., has been appointed general manager of Black & Decker Mfg. Co., Ltd. of Brockville, Ontario, Canada, subsidiary of the Black & Decker Manufacturing Company, Towson, Md. His appointment became effective June 9, 1958. Mr. Wilhide will be responsible for complete operations of the electric tool company in Canada.

Alexis N. Dahl has been appointed purchasing manager of the Black & Decker Manufacturing Company, Towson, Md. He will be responsible for conducting purchasing activities of the company.

Robert D. Black, chairman of the Board, and president of The Black & Decker Manufacturing Company, Towson, Md., has announced that Carl D. McWade and Harry L. Williamson, Jr., have been employed by the company. Their duties will consist of special assignments connected with product planning and development. They will be responsible to R. G. Horner, Vice-President of Marketing.

WILFRED E. WALTON

Wilfred E. Walton has been named director of engineering for DeWalt Division of American Machine and Foundry Company, originator of radial-arm woodworking and metal cutting machines for home, farm, school, and industry. In his newly created position, Mr. Walton will coordinate all engineering operations at DeWalt, reporting directly to the president's office.

CHARLES BESELER COMPANY MAKES PURCHASE

Charles Beseler Company of East Orange, N. J., has announced its purchase of Projection Optics Company, Inc., of Rochester, N. Y., from Fred E. Aufhauser.

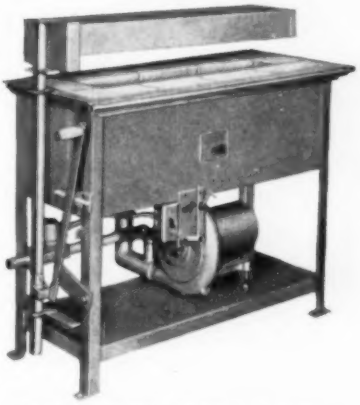
Projection Optics Company, manufacturers of lenses and precision optical equipment, will continue to operate in the Rochester plant under the direction of Philip Berman who has been named president.

J. M. NASH COMPANY PURCHASED CANVAS PRODUCTS CORPORATION

Sale of the Canvas Products Corporation of Fond du Lac, Wis., to the J. M. Nash Company of Milwaukee has been announced by Herman J. Jongeblood, chairman of the board of Nash, and Adolph Kluge, president.

The Nash Company is the leading manufacturer in the United States of sanding machines for all kinds of turned wood and plastic products.

PRACTICAL TEACHING AID



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Descriptive Material

SAMS ANNOUNCES NEW PUBLICATIONS

Howard W. Sams & Co., Inc., announce the following new publications, available immediately.

Servicing Hi-Fi and Associated Audio Equipment — Volumes One and Two.

Volume One (Cat. No. HF-1), 160 pp., 8½ by 11 in., list price, $2.95, contains coverage on 26 models of 1956–58 equipment including power amplifiers, pre-amps, AM-FM receivers and tuners, and public-address amplifiers. Special section covers planning, installation, and maintenance of home music systems.

Volume Two (Cat. No. HF-2), 160 pp., 8½ by 11 in., list price, $2.95, contains the same type of coverage on 27 models of 1956–58 equipment, plus a special section on the planning and installation of stereophonic home music systems. Index is cumulative for both volumes.

Each volume contains a special information section on Hi-Fi Techniques followed by selected Photofact service data on popular makes and models of custom Hi-Fi and Audio equipment. This includes complete photo coverage, schematics, parts lists, voltage and resistance measurements, and servicing information for each piece of equipment.

Besides being invaluable to the technician who services audio equipment, the new series will be of interest to the audiophile and hobbyist who desires complete information on audio equipment.

Sold through electronic parts distributors, or write to Howard W. Sams & Co., Inc.

(For further details encircle index code 0819)

ROCKWELL-DELTA CATALOG

Rockwell Manufacturing Company, Delta Power Tool Division, have prepared their new AB-58 Industrial Catalog which shows their complete line of power tools, many of which are used in schools across the United States and in other parts of the world.

Catalog is available upon request.

(For further details encircle index code 0820)

NEW BULLETIN ON WOODWORKERS' VISES

The Columbian Vise & Mfg. Company have prepared a bulletin describing their new line of woodworkers' vises. Contents include specifications and illustrations of 18 individual vises. Among new features described in detail is Columbian's exclusive 3-point mounting.

This employs two slotted brackets and a center rest, which is to reduce installation time 50 per cent, assure firm, tight fastening, easy operation, and longer life.

Ask for bulletin LL-8216.

(For further details encircle index code 0821)

ARMSTRONG BROS. TOOL COMPANY LITERATURE

Armstrong Bros. Tool Company have on hand a supply of literature, outdated due to price changes, additions to their line, and changes in catalog designation. The four pieces of descriptive material show their tools accurately pictured, and are the same as they currently manufacture.

School people who are interested in material of this type, may expect to receive copies of these circulars, upon reasonable request. The supply is limited, and all requests will be handled on a first-come first-serve basis.

The circulars are entitled: Armstrong Cutting Tools — Bulletin A-C-T; Armstrong Carbide Insert Tool Holders; Armstrong C A Tool Holders and Armaloy Cutter Bits; and Armstrong Carbide Tool Holders.

(For further details encircle index code 0822)

DESCRIPTIVE CIRCULAR

DonJer Products Company, contract manufacturers and assemblers of electronic products, in the field of educational and avocational equipment, have introduced DonJer "Suede-Tex." It is a new astounding refinishing method to obtain a velvet-like finish, both brilliant and soft to the touch. It is available in many beautiful colors, easily applied with a DonJer patented high velocity spray gun.

"Suede-Tex" consists of fine fiber strands, cut to closely controlled uniform lengths of 1/32 of an inch. A special undercoat adhesive is brushed on the object, and this coat of adhesive becomes the base in which each little "Suede-Tex" fiber embeds itself and stays put as ejected from the high velocity spray gun.

This revolutionary method of suede finishing opens new beauties to craft and shop projects. Used to decorate, cover repairs, to apply scratchless bases to wood, metal, plastic, glass, plaster, paper, cardboard, ceramics, etc.

Additional information is available on this product, as well as their complete line of equipment. Write for DonJer Products Company circular.

(For further details encircle index code 0823)

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Are the most popular shop books in America

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All type is the proper size and style for fast, effortless reading of the text. Lines are short for easy eye span.

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Smith's Machine Woodworking was revised in 1958, bringing it completely up-to-date. Its 202 pages tell WHY, are easy to read. The 365 illustrations show HOW. Makes a perfect textbook or reference. **List price, $3.60**

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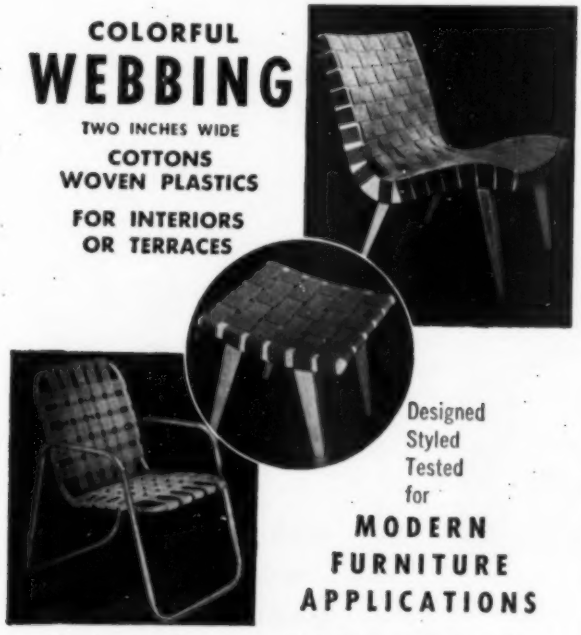

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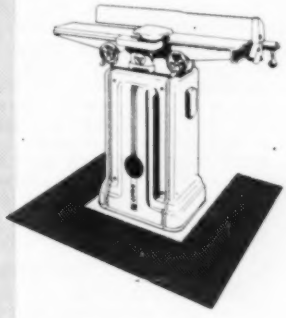

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HARDWOOD CORPORATION OF AMERICA

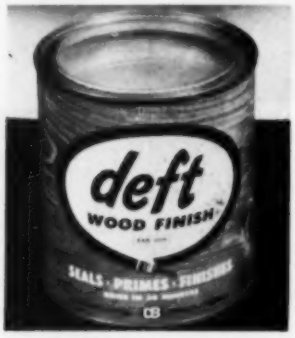
SHOP EQUIPMENT NEWS

(Continued from page 53A)

DEFT WOOD FINISH

Desmond Bros., have made classroom wood finishing easier with Deft Wood Finish.

Deft Wood Finish is a clear semigloss that seals, primes, and finishes. Nothing else to use from raw wood to bar-top finish and it dries in 30 minutes. No thinning is required; it



Deft Wood Finish

does not raise grain, will not darken with age, and will not bloom or blush in damp weather. It makes possible a hand-rubbed-effect finish by simply steel-wooling the final coat.

Deft emphasizes the beauty of the natural wood and creates a mirror-smooth finish without hiding the wood. It can be applied by brush or roller, on large areas, or may be applied with a rag on small pieces. It has many other uses in industrial arts training classes. Write for further information to Desmond Bros.

(For further details encircle index code 0817)

WILHOLD PLASTIC RESIN GLUE

Wilhold Products Company have introduced a new easy mixing powdered glue, to which the user merely adds water. It is Wilhold Plastic Resin Glue (Marine Grade). Its new formula never lumps. This glue goes further and spreads like a smooth cream. Recommended for hardboard laminating, boat building, door and furniture manufacturing, hobbies and cabinetmaking.

New Plastic Resin Glue (Marine Grade)

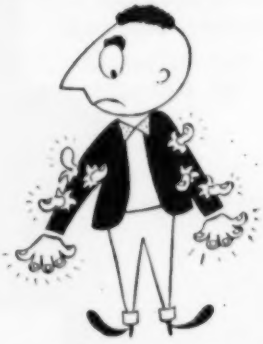
On hard woods it will develop a shear of 3500 p.s.i. It can be mixed with Plastic Resin Mod'fier to eliminate crazing and shrinkage, improving the glue for edge bonding and low pressure uses. Ideal where work is subject to shock and flexing.

Write for free literature on Plastic Resin Glue and Mod'fier.

(For further details encircle index code 0818)

Even students who are

all thumbs



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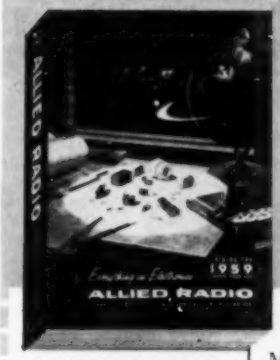

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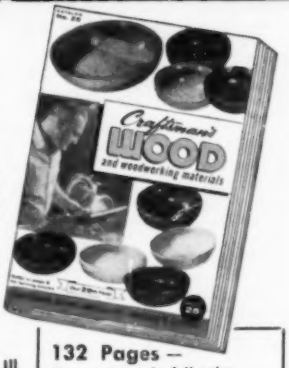

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- Many new woodworking tools
- Same day shipment; guaranteed satisfaction

Shop Equipment News

WALKER-TURNER 8-INCH JOINTER

Walker-Turner, a division of Rockwell Manufacturing Company, recently introduced their 8-in. jointer and 10-in. tilting arbor saw.

The 8-in. jointer is fast, safe, and economical, and features a rugged five-and-a-half foot cast iron bed which allows rapid, accurate production jointing of all sizes of stock. The table is 9 in. wide, facilitating facing of wide stock.

Walker-Turner 8-inch Jointer

School men from all over the country had an opportunity to see this unit displayed at the Walker-Turner exhibit, held at the American Vocational Association's 52nd Annual Convention at Buffalo, N. Y., August 12–15, 1958.

This lightweight tool was displayed along with their 10-in. tilting arbor saw, which is especially compatible with the jointer for school workshop woodworking projects. Its extra big cast iron tables give added safety and facilitate cross cutting and ripping of large stock.

(For further details encircle index code 0801)

ALL-POLYETHELENE SYPHON IS SELF-PRIMING

General Scientific Equipment Company have introduced an all-polyethelene syphon with a built-in "self-starter." The syphon consists of a semi-rigid "U" tube which has an open end and a flexible "squeeze" bulb attached to the other end. The squeeze bulb has a stopcock outlet.

To operate the syphon, the user first places the open end of the "U" tube in the liquid to be syphoned. The stopcock is then closed. Squeezing the bulb primes the syphon by forcing air out of the open end into the liquid. When the bulb is released, the partial vacuum created sucks the liquid into the open end, over the "U" bend in the syphon tube, and, when the stopcock is opened, into a waiting receptacle.

Safe and simple to use, the all-polyethylene syphon is easy to clean and practically unbreakable. It is resistant at normal temperatures to concentrated acids, oxidizing agents, hydroxides, and polar liquids.

The syphon comes in two sizes. Size 1 has a half-inch I.D. tube for use with large drums and carboys. Size 2 has a one-quarter inch I.D. tube for use where a slower flow is suitable.

All-Polyethelene Syphon with built-in "self-starter"

Complete information is available.

(For further details encircle index code 0802)

ACCESSORY TOOLS AVAILABLE IN KITS

The DeWalt Division of American Machine and Foundry Company has instituted a new merchandising idea for the accessory tools to its "Powershop" woodworking machine, offering them as three separate kits packaged in combination display and carry home corrugated boxes manufactured by the Gair Fibre Drum and Corrugated Box Division of Continental Can Company.

Accessory Tools Available in Kits

The three kits — Boring, Routing, and Sanding; Curve Cutting and Finishing; and Shaper-Jointer — are packaged in different size boxes all of which are die-cut to hold the tools securely in place within the boxes. Each of the three packages has a section on the top flap bearing the company name which may be folded up to serve as an attractive display card. Handles are die-cut into one side of the package so that it may be quickly converted into a handy carry home case.

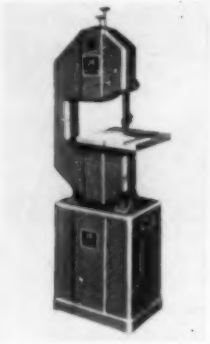
Printed designs on the three cartons vary only in copy designating one kit from another. The boxes' white Gairlite corrugated board is used as one color in the design in combination with red and black, providing effective contrast for printed material.

(For further details encircle index code 0803)

CORRESPONDING CODE INDEX NUMBERS TO BE ENCIRCLED CAN BE FOUND ON THE CARDS IN THE READER'S SERVICE SECTION

YATES-AMERICAN 14-IN. BAND SAW

A new 14-in. woodcutting band saw, model J-114, made by the Yates-American Machine Company, features a heavily ribbed, one-piece frame that eliminates vibration and provides sturdy support for heavy production.



New 14-in. Woodcutting Band Saw

A window in the upper guard enables the operator to check blade tension from the front of the machine. Adjustments for table tilt, wheel tracking, blade tension, guide placement, and changing blades are all made from the operator's position.

The table, supported by double trunnions, tilts 45 deg., right and 10 deg. left. A spring loaded stop pin quickly resets the table at 90 deg. For accurate blade tracking, the side guide supports the blade both above and below the ball-bearing backing guide.

Wheels are covered by hinged doors, and the blade is completely guarded except at point of cut. Wheels are aluminum for quick acceleration. Distance from saw blade to frame is 13¾ in., distance under guide 6½ in. Accessories available are miter gauge, rip fence and rails, and lamp.

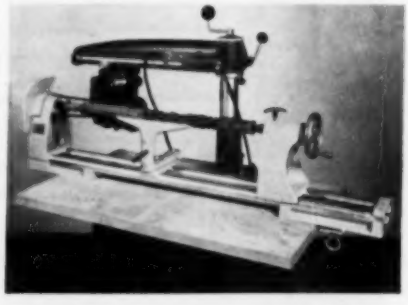
Bulletin available on request.

(For further details encircle index code 0804)

AMF DeWALT NEW WOODWORKING LATHE

DeWalt Division of American Machine & Foundry Company, originator of radial-arm woodworking and metal cutting machines for home, school, farm, and industry, have introduced a new woodworking lathe which can be used either as a radial-arm attachment tool or as an individual tool in an existing workshop.

When used as a DeWalt "Power Shop" accessory tool, the lathe is easily mounted to the machine table top where it is held securely in place by a cleat and an adjustable clamp. The



AMF DeWalt New Woodworking Lathe

complete weight, including base, is only 30½ lb., thereby making storage easy because it can be hung out of the way when not in use, and quickly transferred to the power source of the machine when turning is required. By using the motor of the DeWalt "Power Shop" (Model MB or GW) machine and step pulleys, the rpm of the lathe can be adjusted to any one of four speeds: 1200, 1540, 2025, and 4040.

As a separate tool, the lathe can be powered by an individual motor as a permanent setup. An exclusive guard design permits easy change-over from one speed to another, and gives the operator plenty of "hand room" inside for belt adjustments. The motor may be positioned to the rear of the lathe or beneath it, depending upon the layout of the shop. Holes in the base permit stationary mounting on a table or stand.

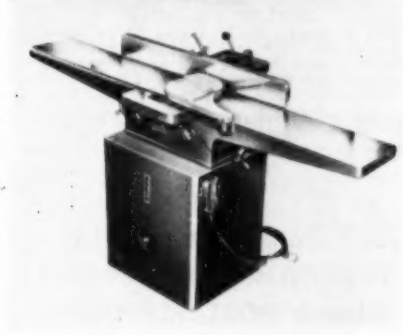
Standard equipment with the lathe is: the drive belt, mounting cleats and bolts, the pulley which fits a ⅝-in. arbor of any motor with a ⅝-in. shaft, a 3¾-in. faceplate hub, plus an adjustable tool rest.

The new lathe is now available through all franchised DeWalt dealers.

(For further details encircle index code 0805)

DELTA'S 8-IN. LONG-BED JOINTER

Rockwell Manufacturing Company, Delta Power Tool Division, have introduced their 8-in. Long-Bed Jointer.



Delta's 8-in. Long-Bed Jointer

This big-capacity jointer handles jobs faster and easier. It features convenient, easy-to-reach controls; a big fence that tilts 45 deg., right and left; fully adjustable infeed *and outfeed* tables; and precision balanced cutterhead.

Shown in accompanying picture is a completely new, heavy-gauge steel, cabinet-type stand that fully encloses the motor, belt, and pulleys. It features a built-in motor mount for quick-easy motor installation. It is also provided with a built-in, nonclogging dust chute that keeps chips and dirt away from the motor.

For more complete information write for the special bulletin on this 8-in. Long-Bed Jointer.

(For further details encircle index code 0806)

NEW KODAK VERIFAX COPIER

A new deluxe model Verifax Copier which can copy anything from a business card to an outside 10- by 16-in. inventory form has been announced by Eastman Kodak Company.

Designated as the Verifax Viscount Copier, the new office copying unit is designed to prove particularly useful to companies requiring copies of larger originals. It can, for example, copy outsize legal documents, accounting forms, 10- by 16-in. automotive dealer financial forms and standard letter-size originals with equal ease.

New Verifax Viscount Copier

The Verifax Viscount Copier has an improved paper feed assembly, a new trimmer guide assembly for 10-in. paper, and makes the same photo-exact copies characteristic of the Verifax copying method.

Complete information on the new Copier is available.

(For further details encircle index code 0807)

THE BROWN & SHARPE "CIRCUITPAK"

The Hydraulics Division of Brown & Sharpe Mfg. Company have announced a new low-cost Hydraulic Power Unit — "Circuitpak."

Compactly assembled with electric motor, hydraulic (oil) pump, valves and oil reservoir, the Brown & Sharpe "Circuitpak" is manifold-circuited for direct connection to cylinder lines.

(Continued on next page)

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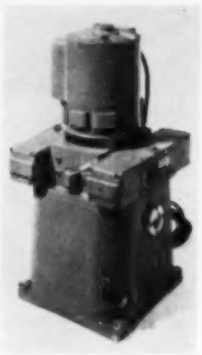
SHOP EQUIPMENT NEWS

(Continued from previous page)

Four pump capacities from .8 to 5 gpm are available with one, one-and-a-half or two h.p. capacitor-start electric motors and up to four solenoid-operated four-way valves. Reservoir capacity is two gallons with nickel-tube heat exchanger cast in housing for cooling oil. Operation is 3600 r.p.m., with pressures up to 1000 psi.



Brown & Sharpe "Circuitpak"

Circuitry employs series connection of valves to effect a priority system of operation whereby oil is blocked from all valves farther down the circuit when any valve in the series is shifted. Return lines are ported directly to the tank. To eliminate overheating when valves are in neutral position, pump discharge is circulated at negligible pressure. "Circuitpaks" may be applied with cylinders of all sizes to provide power for spot welding, vise clamping, indexing, cutting, molding, riveting, lifting, pushing, feed and traverse and many other machine and materials handling operations. Unitary design is especially adaptable for conversion of manually or mechanically operated production equipment to hydraulic automation.

Further information is available on "Circuitpak" Hydraulic Power Units.

(For further details encircle index code 0808)

MULTIPLE UNIT DRAWING TABLE

Brodhead-Garrett Company are introducing their new drawing table designed to fit any need. The drawer unit and drawing board storage can be furnished as insert units, and are interchangeable, so that either the drawer unit or board storage unit can be mounted

Multi Unit Drawing Table

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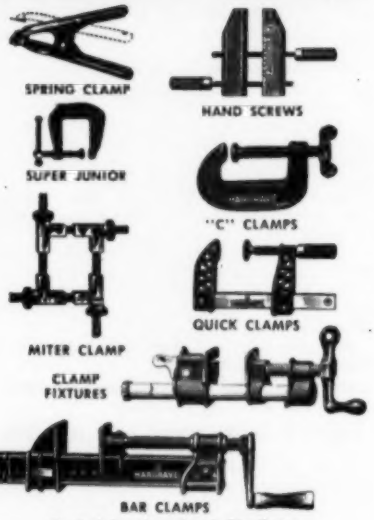

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Due to the Aluminum Construction, the Oven is very light in weight and can be carried from room or project to project. As it operates on 110 volt AC or DC, it can be plugged into any 110 volt receptacle.

SPECIFICATIONS

Model	Interior Size	Wattage 100 AC-DC	F.O.B. Phila. Price
600	12"Wx12"Dx12"H	700	$ 90.00
602	24"Wx12"Dx12"H	1400	140.00

Send for complete details

THE ELECTRIC Hotpack COMPANY, INC.

5067 Cottman Ave. Philadelphia 35, Pa.

in front or in the back as shown in the picture of the completed unit. The opening in the front is used for the student's books while in class. This is the WD-20 Series drawing table.

Over-all table specifications:

Top: ¾ in. thick birch plywood 36 by 26 in., with front pencil ledge. The top is permanently fixed at an angle.

Frame: Solid maple and birch construction.

Bookshelf: Opening 14½ in. wide by 21½ in. deep by 3¾ in. high.

Drawers: Masterkeyed cylinder locks. Inside dimensions 9 in. wide by 18½ in. deep by 3 in. high.

Board Cabinet: Holds 6 drawing boards any size up to 20 by 26 in.

Over-all height: 37½ in. at front and 41½ in. at back.

Finished in natural lacquer, shipped set up and ready for use.

(For further details encircle index code 0809)

SHELDON PRECISION LATHE

Sheldon Machine Company have announced their new 15-in. Sheldon Lathe, designed to fill the gap between conventional belt-driven and geared head lathes.

Different from any previous lathe in its new design (Pat. Pending), this 15-in. lathe offers modern, big-capacity features at an amazingly low cost. By combining the capacity and power of a geared head lathe with the economy and flexibility of a belt-driven lathe, the Sheldon Machine Company has instituted an important new trend in providing industry with new cost-cutting machine tools.

Sheldon Precision Lathe

The most significant new design feature is the fully enclosed headstock with its "Work Holding Only" spindle. Although the high torque drive is direct to the spindle, all radial and thrust loads from the drive are absorbed by large tapered roller bearings supporting an input pulley in the rear of the headstock wall. Power is then transmitted to the spindle through a positive lock clutch in direct drive, or through gears in back-gear drive. As a result, the spindle can utilize its full capacity as a work holder without the stresses of drive pressures or the loss of power inherent in machines with intermediate shafts.

The spindle itself is mounted in "Zero Precision" tapered roller bearings, arranged in the new box-type design for greater accuracy and maximum rigidity. The hole through the spindle is 1½ in.

Because of the unique design of the headstock, back gears can be engaged or disengaged by a single lever on the front of the headstock. A 3-h.p. motor is recommended for

(Continued on next page)

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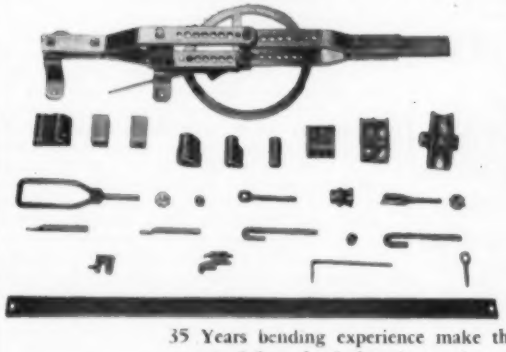

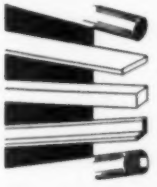

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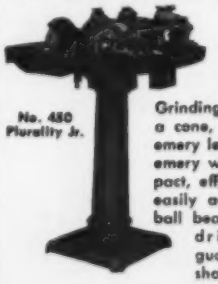

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SHOP EQUIPMENT NEWS

(Continued from previous page)

the high torque drive, which transmits power from the motor through a countershaft, direct to the spindle.

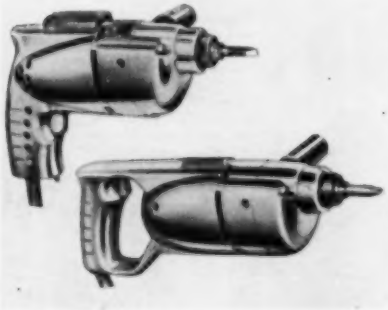
More complete information is available on additional excellent features of this new 15-in. Sheldon Lathe.

(For further details encircle index code 0810)

NEW MILLERS FALLS DRIVER-DRILL

Millers Falls Company, manufacturers of a complete line of portable electric tools, have introduced a unique new power tool, the first of its kind — The Driver-Drill.

The Driver-Drill spans the complete range of driving jobs — from heavy production work to delicate precision fastenings — and also can be used to drill holes in wood or steel. It is a high-torque screw driver which converts to 2⅜-in. drill by means of a "Quick-Change" drill chuck.



New Millers Falls Driver-Drill

It has great appeal for both professional and amateur craftsmen: contractors, pattern-makers, electricians, homeowners, hobbyists, etc. Supplied with saw grip (No. 2660) or pistol grip (No. 2860) the Driver-Drill is equipped with a reversing switch, so located that it cannot be accidentally engaged while the tool is in operation.

A sturdy tool with a full 2-amp. motor, the Driver-Drill has the following capacities: as a screw driver for wood screws, No. 14-3 in.; for machine screws, ¼ in.; and as a drill, ⅜ in. in steel. It combines the speed and ease of production driving with the safety and sensitive control of a hand screw driver. The Driver-Drill is particularly well suited to use on doors, windows, cabinets, cabinet hardware, electrical outlet boxes, core boxes for pattern work, boat fittings, deck planking, truck bodies, trailers, and wood or neon signs.

The tools's ¼-in. hex socket fits all bits, extensions, and adapters with standard ¼-in. hex shank. Standard equipment includes two bits, two finders, finder cap and spring, auxiliary side handle and 7-ft. rubber covered cord with molded plug. A full assortment of bits and accessories, including a handy kit of bits, finders, etc., is available.

(For further details encircle index code 0811)

NEW 2-IN. SPEED TEMPLATE COMPASS

The F. & H. Mfg. Company is introducing to the professional and general draftsman two new ball-bearing action template compasses.

This new precision drafting instrument permits the draftsman to make perfect circles from ¼ to 2 in., in diameter by inserting pencil or pen in the desired hole and spinning around center.

There is an additional row of template holes from $\frac{1}{16}$-in. diameter to $\frac{15}{64}$-in., which

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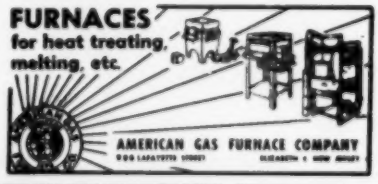

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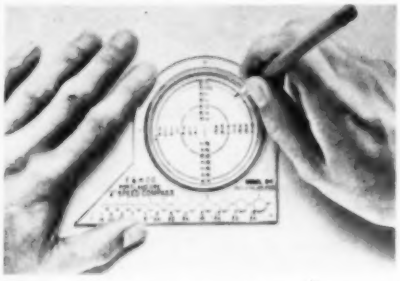
The Draftsman's Model for use with the drafting pencil or "O" pen is graduated in $\frac{1}{32}$ of an inch. The Student Model for general use with regular pencil is graduated in $\frac{1}{10}$ in.



New 2-in. Speed Template Compass

The smooth ball-bearing action assures accurate circles that are always concentric. There is no need for division or setting distances, measurements are automatic. There is no sliding the instrument for different circles. This makes it possible to do work in $\frac{1}{10}$ the time. Work is neater. There are no center point holes in the drawing. Due to integrally cast "feet" there is no smearing or smudging of your work.

The 2-in. Speed Template Compass is compact, measuring only $3\frac{3}{8}$ in. by $4\frac{1}{4}$ in., over all, fits nicely in the draftsman's tray or on the drawing board. Although transparent it is tinted so that it is easy to see. It is always handy, always ready for use without adjustment.

Numerals are indented so they never wear off. Also, it is a durable instrument using precision-made stainless steel ball bearings that are noncorrosive. It can be washed.

For literature and price information write to the manufacturer.

(For further details encircle index code 0812)

GYM-SEAL METHOD OF FINISHING FLOORS

General Finishes Sales and Service Company solves the problem of maintaining good floor finishes with the minimum amount of care. Their Gym-Seal Floor Finish Method provides the solution.

Finishing floors. Properly prepare the floor by sanding; finish sanding with 4/0 Garnet Paper. On floors that have varnish or some other finish, use a power sander to remove the existing surface of finish. 4/0 Garnet Paper should be used for the final floor sanding.

On open-grain woods, such as Red or White Oak, it is not necessary to fill the floors as Gym-Seal Method is a penetrating process of finishing. This process puts the finish into the wood, not on the surface. Should you desire to fill open grain wood, the following procedure should be used.

Filling open grain wood floors. (1) After the final sanding has been completed, a liberal coat of Sealacell should be applied. This can be done by using a brush, mop, or squeegee to apply the clear Sealacell to the floor. After the Sealacell has been applied, allow the material to dry for about 15 minutes. This first coat of Sealacell is to level off or equalize the suction of the soft winter growth

(Continued on next page)

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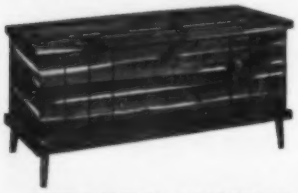
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SHOP EQUIPMENT NEWS

(Continued from previous page)

with the hard summer growth. (2) Cut natural paste wood filler with Sealacell, until you have a mixture the consistency of heavy coffee cream, making a Sealacell filler. The filler should be applied to the floor with a brush, cross-grain, then lightly brush with the grain. The filler should remain on the floor for another 15 minutes to a half hour — then use a clean dry cloth and lightly wipe out the excess filler with the grain of the wood. Allow the floor to dry overnight. (3) The next day use the power buffer and place a pad of 4/0 fine steel wool between the buffer and the floor. Buff the floor with the grain of the wood to remove any dust that may have settled during the course of drying. Then remove the steel wool and buff the floor with the power buffer. (4) A coat of Gym-Seal should be applied with a cloth or brush in a circular motion, wiping out with the grain. Allow this coat of Gym-Seal to dry overnight. The next morning buff with steel wool under the power buffer, and then buff the surface with the power buffer. A second coat of Gym-Seal should be applied in the same manner. Let it dry overnight and buff the floor as previously described.

Sealacell and Gym-Seal are available in 5-gallon and 50-gallon containers. Further information available.

(For further details encircle index code 0813)

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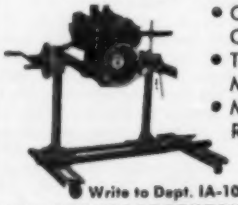
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(For further details encircle index code 0814)

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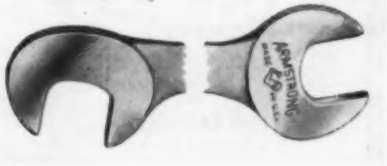
Armstrong Bros. Tool Company announces the addition to its wrench line of two 15- and 75-deg. angle opening miniature wrenches.



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(For further details encircle index code 0815)

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For further information write to Alvin & Company, Inc.

(For further details encircle index code 0816)

(Continued on page 44A)

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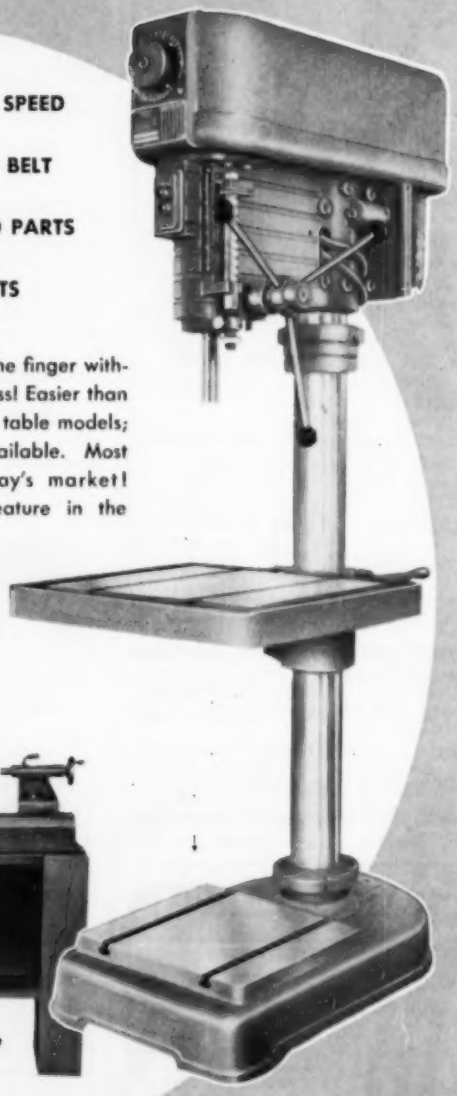

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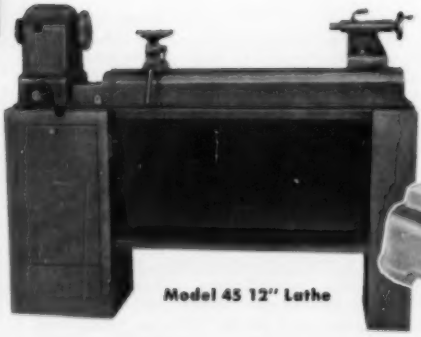

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105	**American Technical Society**..... Textbook publishers. Free catalog.	48A
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107	**Arisco Associates** ..... Drawing stand. Use coupon to order.	31A
108	**Armstrong Bros. Tool Co**..... Standard tools and tool holders.	10A
109	**Atlas Press Company, The**..... Clausing 6300 series lathes.	23A
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1011	**Bergen Arts & Crafts**..... Copper enamelling course. Free catalog of supplies.	52A
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1023	**Cincinnati Tool Company, The**. Complete line of tools.	48A
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1040	**Foley Manufacturing Co**..... Saw filers.	10A
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ADVERTISING INDEX

100	107	1014	1021	1028	1035	1042	1049	1056	1063	1070	1077	1084	1091	1098	10104
101	108	1015	1022	1029	1036	1043	1050	1057	1064	1071	1078	1085	1092	1099	10105
102	109	1016	1023	1030	1037	1044	1051	1058	1065	1072	1079	1086	1093	10100	10106
103	1010	1017	1024	1031	1038	1045	1052	1059	1066	1073	1080	1087	1094	10101	10107
104	1011	1018	1025	1032	1039	1046	1053	1060	1067	1074	1081	1088	1095	10102	10108
105	1012	1019	1026	1033	1040	1047	1054	1061	1068	1075	1082	1089	1096	10103	10109
106	1013	1020	1027	1034	1041	1048	1055	1062	1069	1076	1083	1090	1097		1034A

NEW SUPPLIES AND EQUIPMENT

0801	0803	0805	0807	0809	0811	0813	0815	0816	0817	0818	0819	0820	0821	0822	0823
0802	0804	0806	0808	0810	0812	0814									

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101	108	1015	1022	1029	1036	1043	1050	1057	1064	1071	1078	1085	1092	1099	10105
102	109	1016	1023	1030	1037	1044	1051	1058	1065	1072	1079	1086	1093	10100	10106
103	1010	1017	1024	1031	1038	1045	1052	1059	1066	1073	1080	1087	1094	10101	10107
104	1011	1018	1025	1032	1039	1046	1053	1060	1067	1074	1081	1088	1095	10102	10108
105	1012	1019	1026	1033	1040	1047	1054	1061	1068	1075	1082	1089	1096	10103	10109
106	1013	1020	1027	1034	1041	1048	1055	1062	1069	1076	1083	1090	1097		1034A

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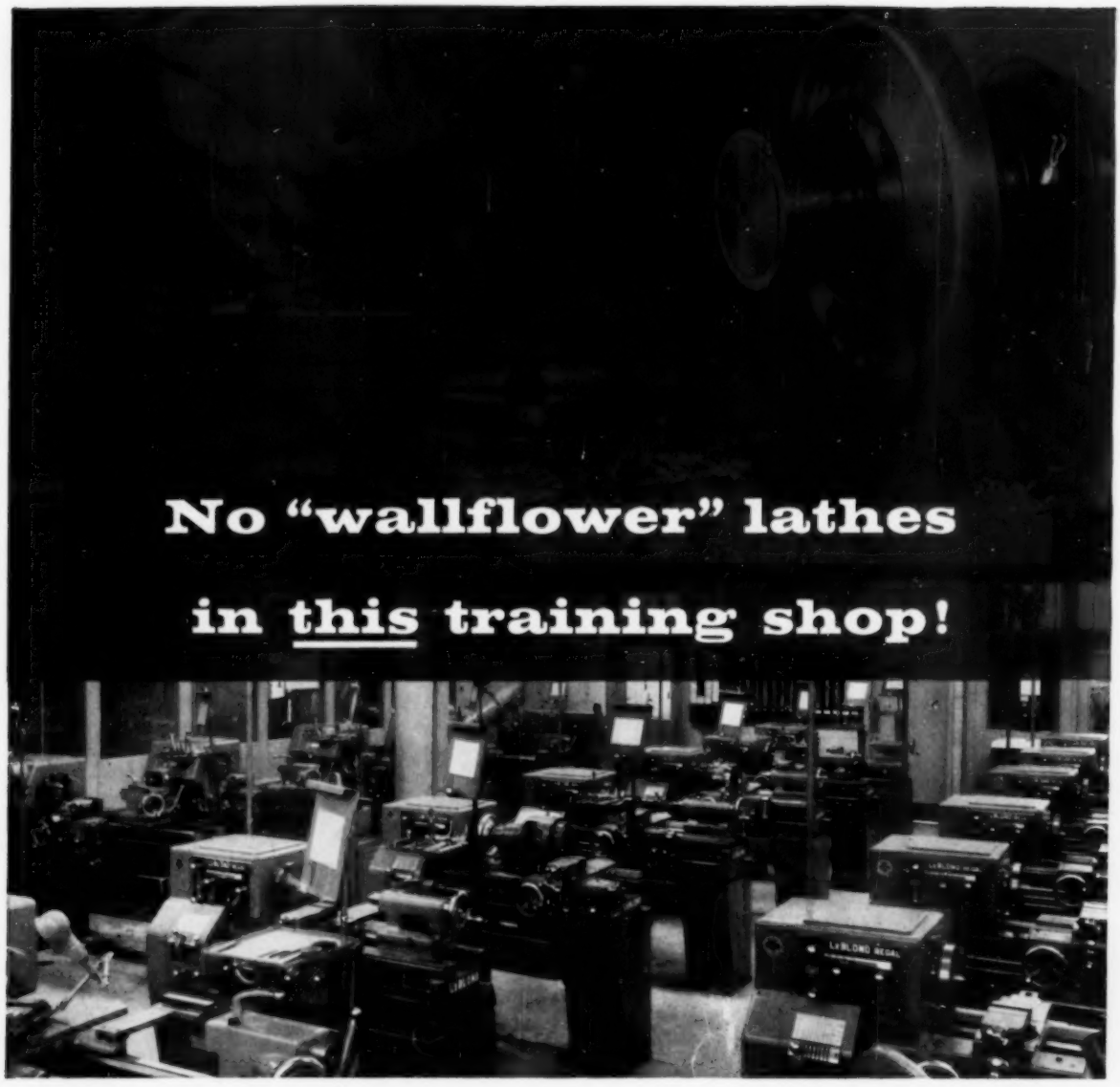

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